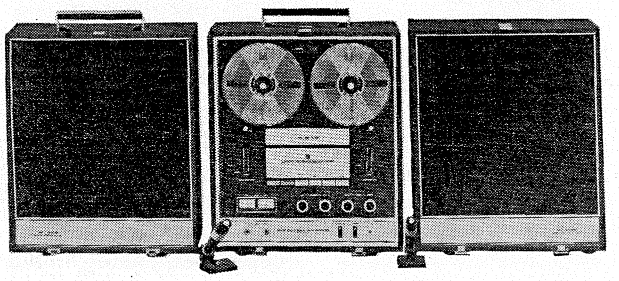
Service Manual

Sharp



MODEL

RD-709

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HAYAKAWA ELECTRIC CO., LTD.

OSAKA, JAPAN

SPECIFICATIONS

Transistor Complement:

Q1, Q2	2SB440	1st Audio Amplifier
Q3, Q4	2SB439	2nd Audio Amplifier
Q5, Q6	2SB54	Audio Line Output
Q7, Q8	2SB54	3rd Audio Amplifier
Q9, Q10	2SB56	4th Audio Amplifier
Q11, Q12	2SB56A	Audio Driver
Q13, Q14	2SB463	Audio Output
Q15, Q16	2SB463	Audio Output
Q17, Q18	2SB415	Ripple Filter

Tape Speeds .... 7 1/2 ips, 3 3/4 ips, 1 7/8 ips

Reel Size..................... 7″ (18cm) maximum

Frequency Response ... 25 to 18,000 cps at 7 1/2 ips
30 to 10,000 cps at 3 3/4 ips
50 to 4,000 cps at 1 7/8 ips

Record/Playback Time:

	(at 7-1/2 ips)	(at 3-3/4 ips)	(at 1-7/8 ips)
Stereo	1 hour	2 hours	4 hours
Monaural	2 hours	4 hours	8 hours

Fast Forward Time...... 1 minute (approx.)

Fast Backward Time ... 1 minute (approx.)

Power Output
per Channel...... 8 watts Music Power

Speakers:
Woofers .... 8″ PM (8 ohms) × 2
Tweeters.................. 2 3/8″ PM (8 ohms) × 2

Power Requirements ... AC 110/200/220/240V, 50/60Hz

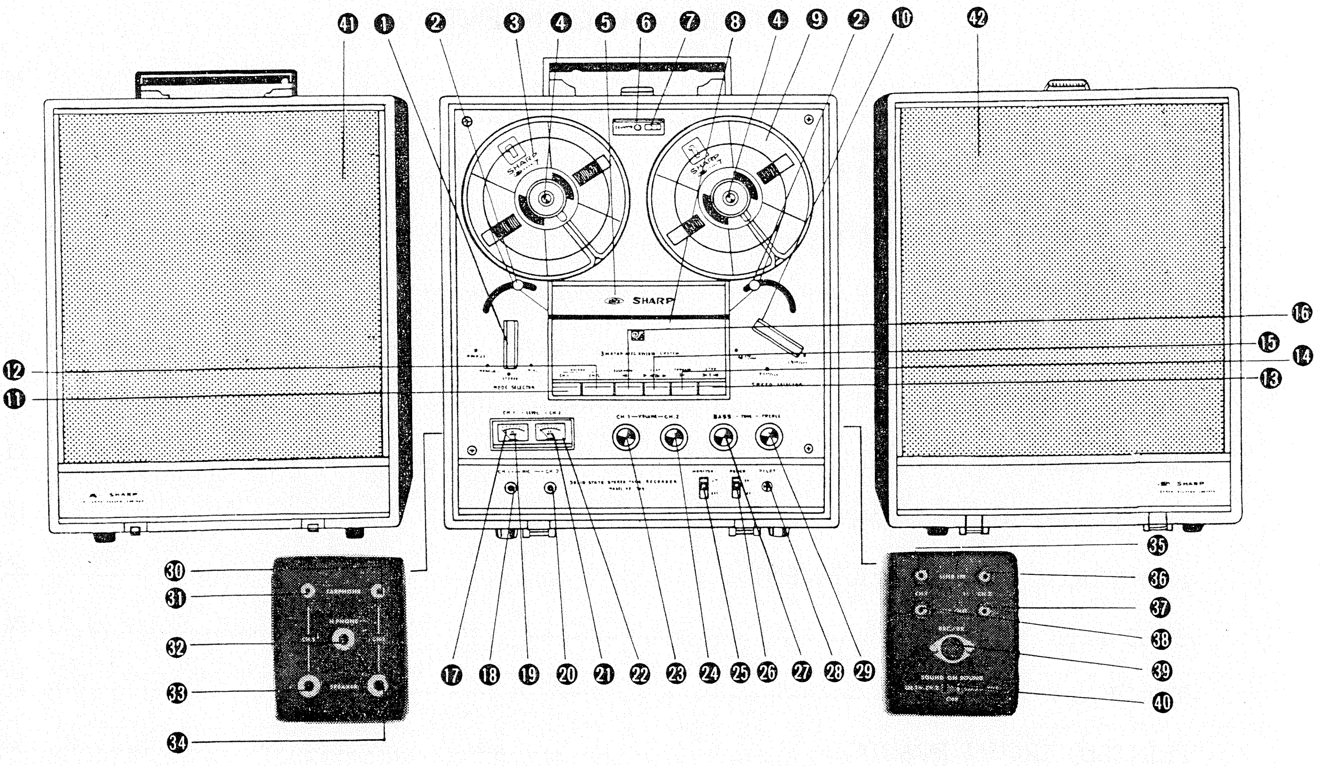
Power Consumption...... 125 watts

Input Circuits .... Microphone Inputs, 10Kohm IMP
Line Inputs, 470K ohm IMP

Output Circuits........... External Speaker, 8 ohm IMP
Line Outputs, 50K ohm IMP
Earphone, 8 ohm IMP
Stereo Headphone, 8 ohm IMP

Integrated Input
Output Circuit .... 5-pin DIN Socket

DESIGNATION OF EXT. PARTS



① Mode selector
② Tension arm
③ Left side reel
④ Reel retainer
⑤ Head cover
⑥ Tape counter reset button
⑦ Tape counter
⑧ Front cover
⑨ Right side reel
⑩ Speed selector
⑪ Record button for CH-1
⑫ Record button for CH-2
⑬ Stop button
⑭ Forward button
⑮ Fast button
⑯ Backward button
⑰ VU meter for CH-1
⑱ Microphone jack for CH-1
⑲ Record indicator for CH-1
⑳ Microphone jack for CH-2
㉑ Record indicator for CH-2
㉒ VU meter for CH-2
㉓ Volume control knob for CH-1
㉔ Volume control knob for CH-2
㉕ Sound monitor switch
㉖ Power switch
㉗ Tone control knob (bass)
㉘ Pilot lamp
㉙ Tone control knob (treble)
㉚ Earphone jack for CH-1
㉛ Earphone jack for CH-2
㉜ Stereo headphone jack
㉝ Speaker jack for CH-2
㉞ Speaker jack for CH-1
㉟ Line In jack for CH-1
㊱ Line In jack for CH-2
㊲ Line Out jack for CH-2
㊳ Line Out jack for CH-1
㊴ Din socket
㊵ Sound on sound switch
㊶ Speaker enclosure for CH-1
㊷ Speaker enclosure for CH-2

Figure 1

POWER FREQUENCY CHANGE

When power frequency change is required, proceed as follows.

1. From 50Hz to 60Hz (Refer to Figure A)
   1) Remove the MOTOR PULLEY (85B) according to MOTOR PULLEY REMOVAL.
   2) Install the MOTOR PULLEY (85A).
   3) Disconnect the JUMPER WIRE across the terminal "0.2" and "1.3".
   4) Adjust the BACK TENSION TORQUE and the TAKE-UP TORQUE according to BACK TENSION & TAKE-UP TORQUE ADJUSTMENT.
2. From 60Hz to 50Hz (Refer to Figure B)
   1) Remove the MOTOR PULLEY (85A) according to MOTOR PULLEY REMOVAL.
   2) Install the MOTOR PULLEY (85B).
   3) Connect the JUMPER WIRE across the terminal "0.2" and "1.3".
   4) Adjust the BACK TENSION TORQUE and the TAKE-UP TORQUE according to BACK TENSION & TAKE-UP TORQUE ADJUSTMENT.

POWER VOLTAGE CHANGE

1. Open the ACCESSORY COMPARTMENT LID.
2. Pull out the PLUG and then set the desired voltage on the PLUG to arrow head on the chassis.
3. Insert the PLUG to the socket.

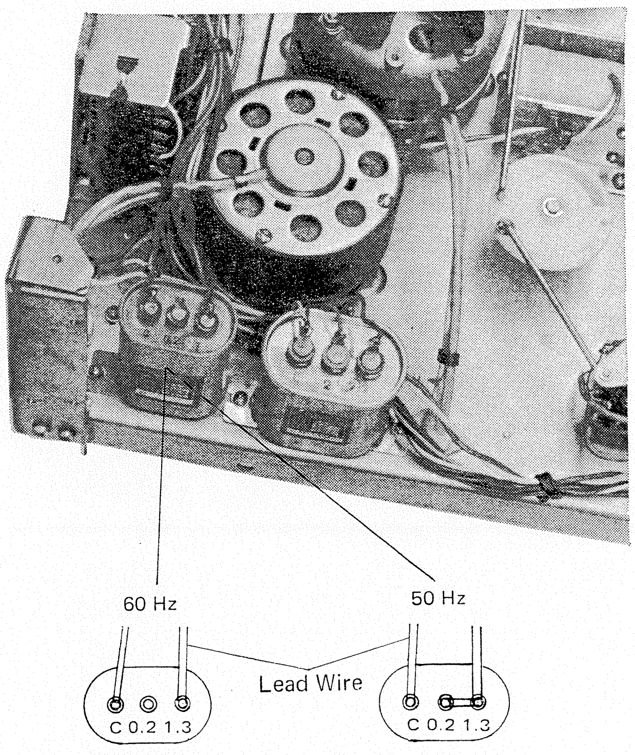


Figure A

Figure B

OPERATING INSTRUCTIONS

Preliminary

1. Open the accessory compartment cover on back of the unit and take out all the accessories.
2. Select a location near an AC outlet. The unit can be used either in a horizontal or vertical position.
3. Separate the speaker enclosures and position them so that you are in the center of both speakers.
4. Connect the INPUT jacks of the speaker enclosures to the EXT. SP. jacks of the recorder with the enclosed connecting cables.
5. Plug the AC linecord into any convenient outlet (AC 110, 200, 220, or 240V, 50 or 60 Hz)
6. Place a full reel of tape on the left reel spindle and an empty one on the right. Fix the reels with the reel retainer caps.
7. Thread the tape as shown in Figure 2. Be sure to pass the tape around the two tension arms. Take up the slack by turning the reels until the tension arms come to the points in the figure.
8. Select tape speed as desired with the SPEED SELECTOR KNOB.
9. Turn on the POWER ON/OFF switch. Power is now supplied to the PRINTED CIRCUIT BOARDS.

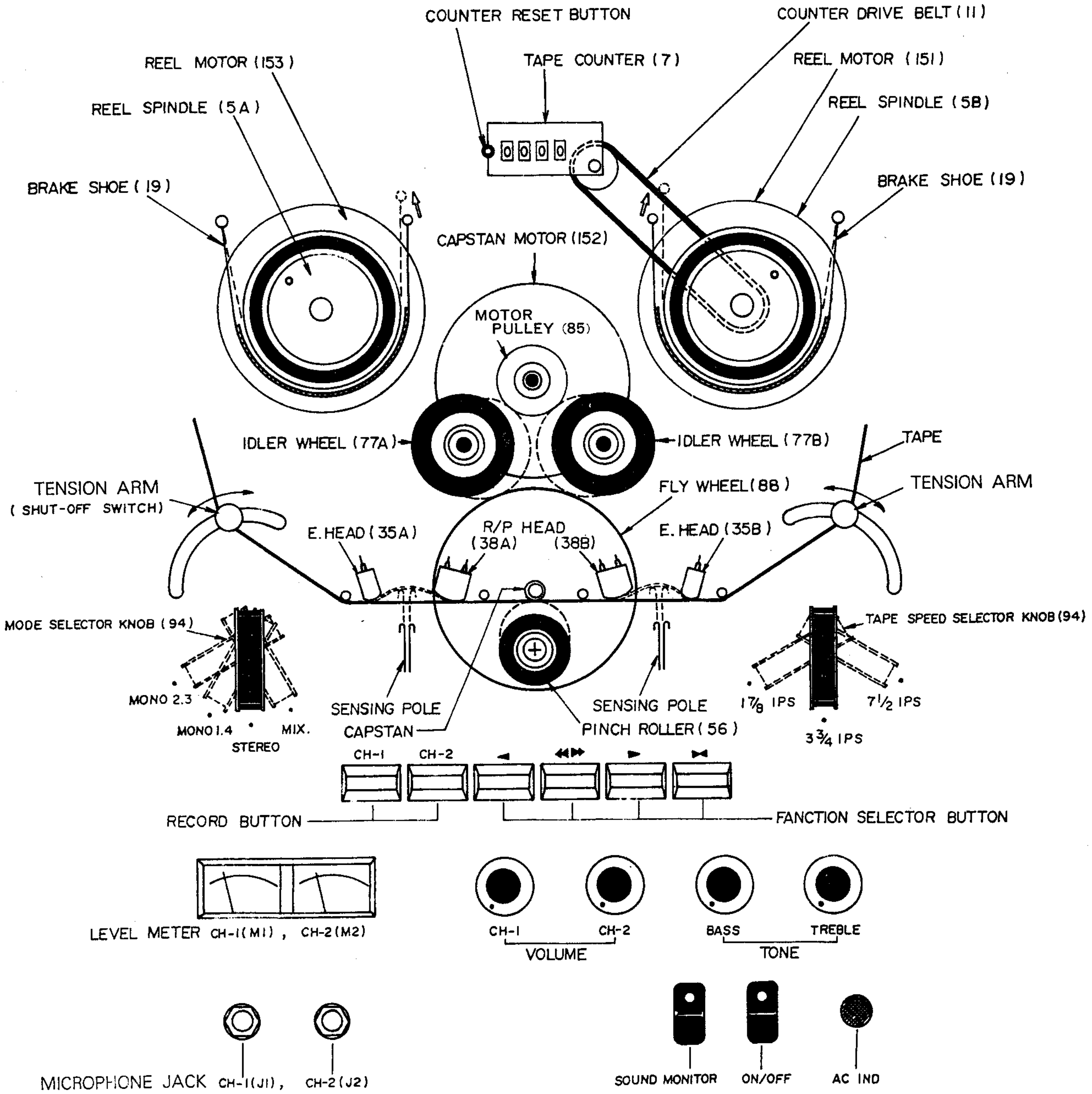

COUNTER RESET BUTTON
COUNTER DRIVE BELT (11)
REEL MOTOR (153)
TAPE COUNTER (7)
REEL MOTOR (151)
REEL SPINDLE (5A)
REEL SPINDLE (5B)
BRAKE SHOE (19)
BRAKE SHOE (19)
CAPSTAN MOTOR (152)
MOTOR PULLEY (85)
IDLER WHEEL (77A)
IDLER WHEEL (77B)
TAPE
TENSION ARM (SHUT-OFF SWITCH)
TENSION ARM
FLY WHEEL (88)
E. HEAD (35A)
R/P HEAD (38A) (38B)
E. HEAD (35B)
MODE SELECTOR KNOB (94)
TAPE SPEED SELECTOR KNOB (94)
MONO 2.3
MONO 1.4
MIX.
STEREO
SENSING POLE
CAPSTAN
SENSING POLE
PINCH ROLLER (56)
1⅞ IPS
3¾ IPS
7½ IPS
CH-1
CH-2
◄
◄◄►►
►
►◄
RECORD BUTTON
FANCTION SELECTOR BUTTON
LEVEL METER CH-1(M1), CH-2(M2)
CH-1
CH-2
VOLUME
BASS
TREBLE
TONE
MICROPHONE JACK CH-1(J1), CH-2(J2)
SOUND MONITOR
ON/OFF
AC IND

Figure 2

Monaural Recording with Microphone and Playback

1. Turn the CH-1 VOLUME (or CH-2 VOLUME) knob clockwise approximately 2/3 of its maximum rotation distance.
2. Plug a microphone into the MICROPHONE JACK (J1 or J2).
3. Depress the COUNTER RESET BUTTON. Counter dials now register "OOOO".
4. Press the FORWARD or BACKWARD BUTTON with your left hand. At the same time press the CH-1 (or CH-2) RECORD button with your right hand.
5. Hold the microphone approximately two inches from your lips and speak in a normal voice.
6. Adjust the CH-1 VOLUME (or CH-2 VOLUME) control so that your loudest words do not make the needle on the CH-1 (or CH-2) VU METER move out of the normal range of the scale. (Refer to Figure 3.)
7. When finished recording, press the STOP button.
8. To rewind (or advance) the tape press the BACKWARD (or FORWARD) and FAST buttons simultaneously, and observe the tape counter dials. When the dials register "OOOO", press the STOP button.
9. Set the MODE SELECTOR to the MONO 1, 4 (or MONO 2, 3) position.
10. Now press the FORWARD BUTTON and listen to the recording.
11. Adjust CH-1 (or CH-2) VOLUME, BASS, TREBLE controls as desired.

Stereo Recording with Microphone and Playback

1. Turn CH-1 and CH-2 VOLUME controls clockwise approximately 2/3 of their maximum rotation distance.
2. Plug the Microphone cord into MICROPHONE JACKS (J1 and J2).
3. Depress the RESET BUTTON. Counter dials now register "OOOO".
4. Depress the FORWARD (or BACKWARD) button with your right hand. At the same time depress CH-1 and CH-2 RECORD buttons. The RECORD buttons should be locked in their depressed position.
5. Speak into the two microphones with a normal voice.
6. Adjust CH-1 and CH-2 VOLUME controls so that your loudest words do not make the needles on the VU METERS move beyond the "O" position on the scale.
7. When finished recording, press the STOP button.
8. To rewind (or advance) the tape press the BACKWARD (or FORWARD) and FAST buttons. Observe the counter dials. When the dials again register "OOOO" press the STOP button.
9. Set the MODE SELECTOR knob to STEREO position.
10. Now press the FORWARD (or BACKWARD) button and listen to the recordings.
11. Readjust CH-1 and CH-2 VOLUME, BASS and TREBLE controls as desired.

Recording from Phono or Radio

Two accessory cables equipped with plugs on both ends are supplied with this recorder. For direct monaural or stereophonic recording from a phono or radio do the following:

1. Insert the accessory cable plugs between the sockets of the phono or radio, and the LINE INPUT sockets of this recorder. (If a DIN connector cable (optional) is available, insert it between the DIN sockets of each unit.)
2. Proceed as outlined in "Recording with Microphone".

Sound with Sound Recording and Playback

1. Repeat the steps outlined in "Monaural Recording" on CH-1.
2. Unplug the microphone cord from CH-1 MICROPHONE JACK, and plug it into CH-2 MICROPHONE JACK.
3. Repeat the steps outlined in "Monaural Recording" on CH-2, while simultaneously monitoring the recordings on CH-1.
4. When monitoring the recordings on CH-1, be careful not to move the microphone too close to the speakers. Otherwise feedback (squeal) effects will result. When using an earphone for monitoring, connect it into CH-1 EARPHONE JACK.
5. When finished recording press the STOP button.
6. To rewind (or advance) the tape press the BACKWARD (or FORWARD) and the FAST buttons simultaneously, observe the counter dials. When the dials register "OOOO", press the STOP button.
7. Set the MODE SELECTOR knob to STEREO position.
8. Press the FORWARD (or BACKWARD) button and listen to the recordings on both channels.
9. Readjust the CH-1 and CH-2 VOLUME, BASS and TREBLE controls as desired.

(Note: CH-1 and CH-2 may be switched in the above steps.)

Sound on Sound Recording and Playback

Truely professional sound on sound recording can be performed with this recorder by shifting the recordings from one channel to the other. This enables mixed recordings on one channel. It also enables separate multiple sound recordings on a single track by repeating the procedure. For example, one person can play a trio by recording three musical instruments A, B and C as follows:

1. Record instrument A on CH-1 in the same way as outlined in "Recording with Microphone".
2. Put the SOUND ON SOUND switch in CH-1 ▶ CH-2 position.
3. Playback the recording on CH-1 (instrument A). Adjust CH-1 VOLUME control so that the pointer of CH-2 VU meter swings to the optimum position. (In this case,both VU meters swing.)
4. After the output level of CH-1 (which is the input level of CH-2) is adjusted, rewind the tape to the beginning.
5. Insert the microphone plug into CH-2 MICROPHONE jack. Adjust CH-2 VOLUME control so that the pointer of CH-2 VU meter swings to an optimum position. In this case, CH-2 VU meter does not indicate the input level from CH-1, but rather from the microphone.
6. Set the MODE SELECTOR knob to MONO 1, 4 position.
7. While monitoring the recordings on CH-1 (instrument A), record instrument B on CH-2.
8. After you have finished recording instrument B on CH-2, rewind the tape to the beginning.
9. Set the SOUND ON SOUND switch to the CH-1 ▶ CH-2 position.
10. Readjust CH-1 and CH-2 VOLUME controls as mentioned in Steps 3 and 5.
11. Set the MODE SELECTOR knob to MONO 2, 3 position.
12. While monitoring the recordings on CH-2, record instrument D on CH-1. Now instrument A, B and C are all recorded on CH-1.
13. Rewind the tape to the beginning and playback the recording on CH-1 with the MODE SELECTOR knob set to MONO 1, 4 position.

(Note: when sound on sound recording is finished, be sure to set the SOUND ON SOUND switch to OFF position.)

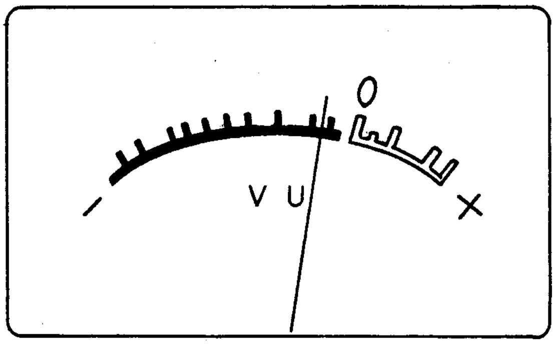


Figure 3

CONTROL FUNCTIONS

Volume Controls

The VOLUME controls (CH-1 - R235, CH-2 - R236) determine the recording level when used in the RECORD mode, and the playback level when used in the PLAYBACK mode.

Tone Controls

The BASS control (R238) and the TREBLE control (R237) obtain desired tone quality when operating the recorder in PLAYBACK mode. Adjustment of either control affects the output of both channels. These TONE controls have no effect when recorder is operated in the RECORD mode.

Sound Monitor Switch

The SOUND MONITOR switch (S8) is normally set in OFF position. If you desire to listen to a sound while recording it, set the SOUND MONITOR switch (S8) in ON position. The sound being recorded will be reproduced simultaneously through the speakers. This function also enables the recorder to be used as a public address system. when operated in this manner care must be taken not to move the microphones too close to the speakers, otherwise feedback will cause a squeal or howl to be produced through the speakers.

VU Meters (Level Indicators)

In the record and playback modes the VU meters (M1, M2) are electrically connected to the audio output stage through the RECORD/PLAYBACK switches (S1, S2). Large scale professional VU meters ensure accurate level control.

Sound on Sound Switch

The SOUND ON SOUND switch is located on the right-hand side of the recorder. Normally it is set in OFF position. When you want to make sound on sound recording, turn the SOUND ON SOUND switch to CH-1 ▶ CH-2 (or CH-2 ▶ CH-1) position. When the SOUND ON SOUND switch is turned to CH-1 ▶ CH-2 position, external source can be recorded on CH-2. Recordings on CH-1 can be shifted to CH-2 and mixed recordings are thus made on CH-2.

Mode Selector Switch

The MODE SELECTOR switch (S7) operates only in PLAYBACK mode. The positions of this switch are MONO 1, 4, MONO 2, 3, STEREO and MIX. To reproduce recordings on track 1, (or 4) set the MODE SELECTOR switch to MONO 1, 4 position and press the FORWARD (or BACKWARD) button. To reproduce recordings on track 2 (or 3), set the MODE SELECTOR switch to MONO 2, 3 position and press the BACKWARD (or FORWARD) button. When this switch is in STEREO position the unit provides stereophonic reproduction of the recordings on tracks 1 and 3 (forward tape direction) or tracks 2 and 4 (backward tape direction) MIX. position on this switch provides mixed reproduction of the recordings on 2 tracks (tracks 1, 3 or 2, 4) through both channels.

Push Button Controls

The push button controls are used to actuate or stop the movement of the tape and select the direction of its movement. The seven operating modes are as follows:

1) Forward Play (Refer to Figure 4)

When the FORWARD PLAY button is pressed the following movements are automatically performed:

1. Electrical current flows through the CAPSTAN MOTOR (152), REEL MOTORS (151, 153), PRINTED CIRCUIT BOARDS (136, 146) and SOLENOID PLUNGER (left) (L11) and PINCH ROLLER SOLENOID PLUNGER (L13).
2. The SOLENOID PLUNGER (left) (L11) pulls and contacts the PLUNGER CONNECTING PLATE (2) and moves the ACTION LEVER (20). The ACTION LEVER then moves the BRAKE SHOE (19) from the REEL SPINDLES (4, 12) and contacts the IDLER (77) to the MOTOR PULLEY (85) and then to the FLYWHEEL (88).

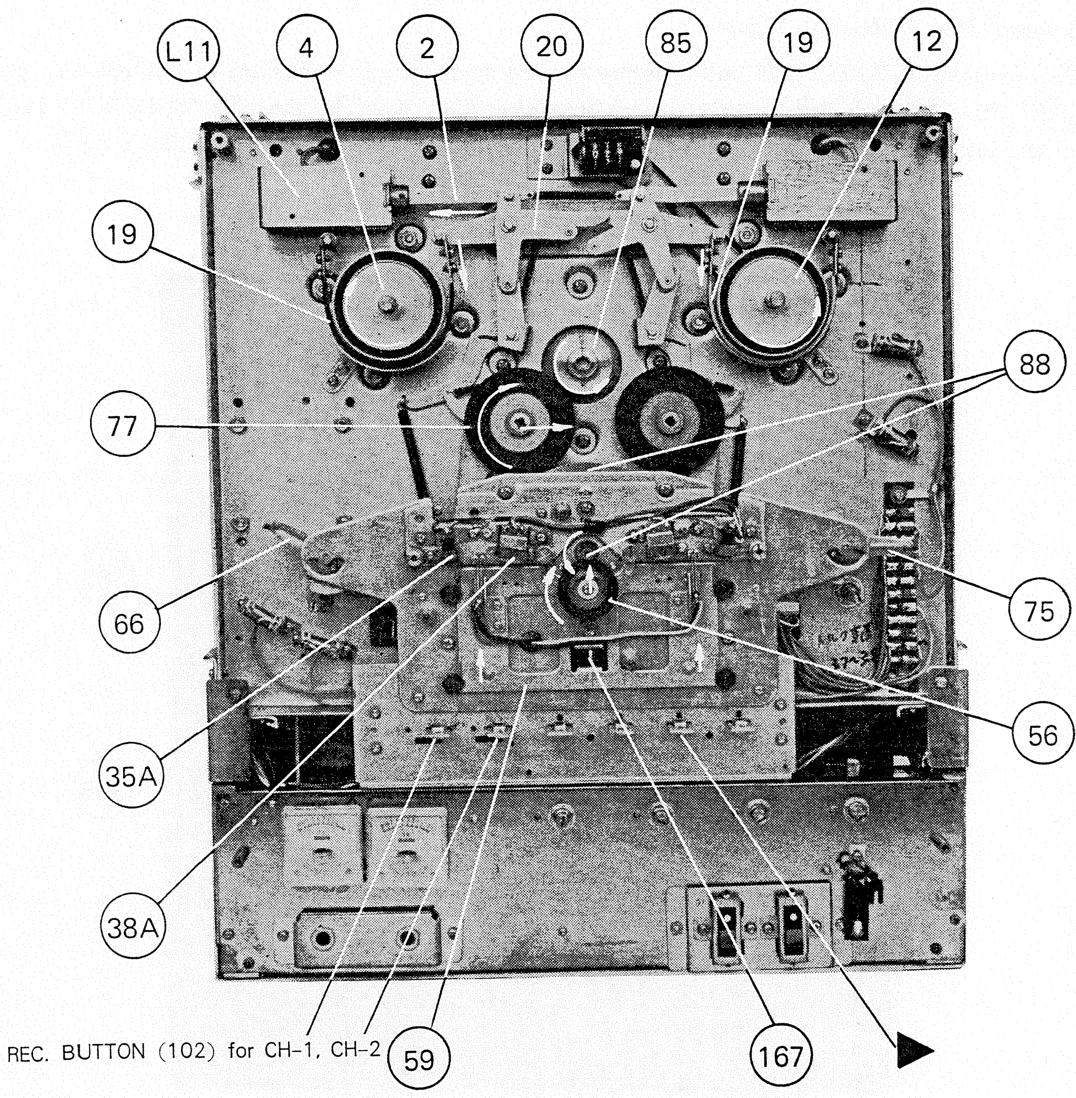


Figure 4

3. The PINCH ROLLER SOLENOID PLUNGER (L13) pulls the PINCH ROLLER LEVER (167) in the direction of the arrow. The PINCH ROLLER BRACKET (59), slides the PINCH ROLLER BRACKET in the direction of the arrow and presses the PINCH ROLLER against the CAPSTAN (88).
4. The CAPSTAN MOTOR (152) rotates the co-axial MOTOR PULLEY (85), IDLER (77) and FLYWHEEL & CAPSTAN ASSEMBLY (88). Resulting friction runs the tape with PINCH ROLLER (56).
5. The right REEL MOTOR (151) rotates the co-axial REEL SPINDLE (12) and takes up the tape. While the left REEL MOTOR (153) rotates the co-axial REEL SPINDLE (4) it provides the tape with adequate back tension to prevent it from becomming slack or broken.
6. While the tape is running, the TENSION ARMS also prevent the tape from becomming slack or broken.

2) Backward Play (Refer to Figure 5)

When the BACKWARD PLAY button is pressed the symmetrical mechanism of this recorder performs the same as in FORWARD PLAY position with a reverse tape direction. That is, the right SOLENOID PLUNGER operates instead of the left one. The motors rotate in reverse direction from the FORWARD PLAY mode.

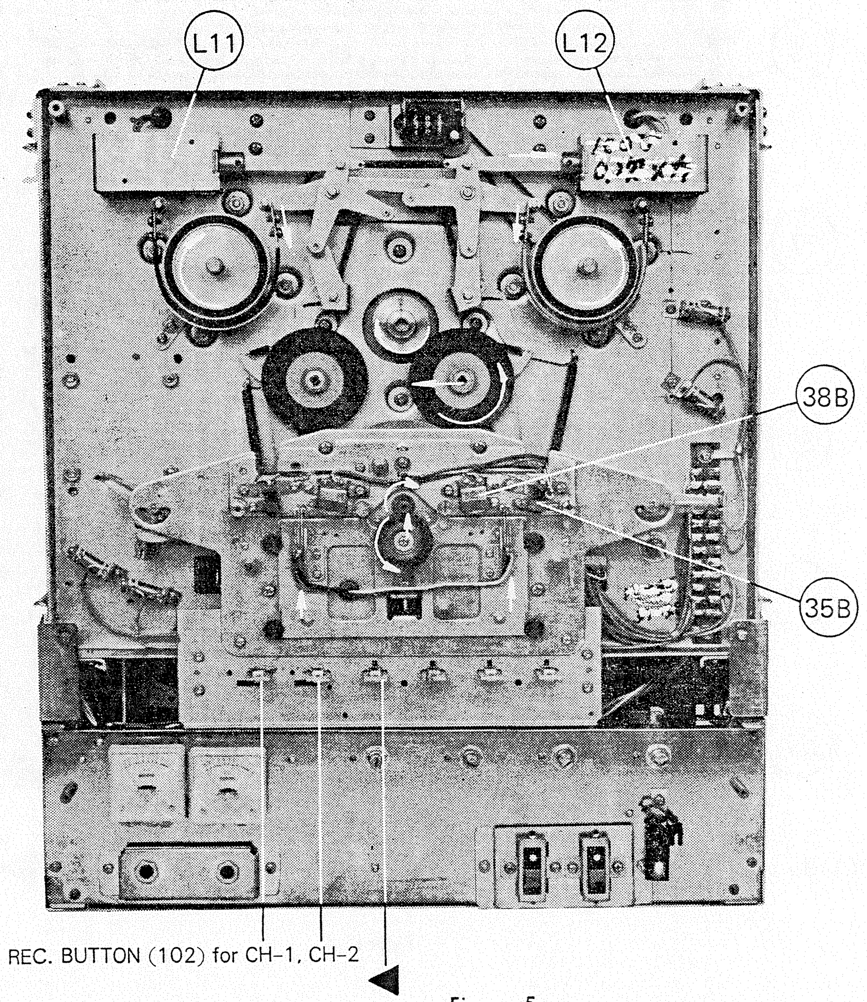


Figure 5

3) Forward Record

In order to put this recorder in RECORD mode, keep the RECORD button (102) pressed until the FORWARD button is pressed. The RECORD button must be locked in a pressed position. When the recording circuit of the PRINTED CIRCUIT BOARD (136) begins to operate, an erase current flows in the ERASE HEAD (35) and a record bias current is supplied to the RECORD/PLAYBACK HEAD (37A). The output of the record circuit is applied to the LEVEL INDICATORS (M1, M2) for monitoring purposes.

4) Backward Record

Press the BACKWARD button and lock the RECORD button in a pressed position in the same manner as in Forward Record. An erase current is supplied to the ERASE HEAD (35B) and a record bias current to the RECORD/PLAYBACK HEAD (37B).

5) Stop (Refer to Figure 6)

When the STOP button is pressed the ACTION SOLENOID PLUNGER (L11 or L12) is released. The BRAKE SHOE (19) pushes the REEL SPINDLES (4, 12). At the same time, all electrical current to motors (151, 152, 153) and SOLENOID PLUNGERS is shut off. The amplifier circuit continues to operate even though the SHUT OFF SWITCH (S12) or the POWER SWITCH (S1) is turned off.

6) Fast Forward (Refer to Figure 7)

When the FAST and FORWARD buttons are pressed simultaneously the following operation is performed:

1. Electrical current flows to the left ACTION SOLENOID PLUNGER (L11) and the right REEL MOTOR (151).
2. The left ACTION SOLENOID PLUNGER operates in the same way as in the Forward Play mode. The BRAKE SHOE (19) moves off from the REEL SPINDLES (4, 12).

7) Fast Backward (Figure 8)

When the FAST and BACKWARD buttons are pressed simultaneously the right ACTION SOLENOID PLUNGER (L12) and the left REEL MOTOR (153) performs FAST BACKWARD operation.

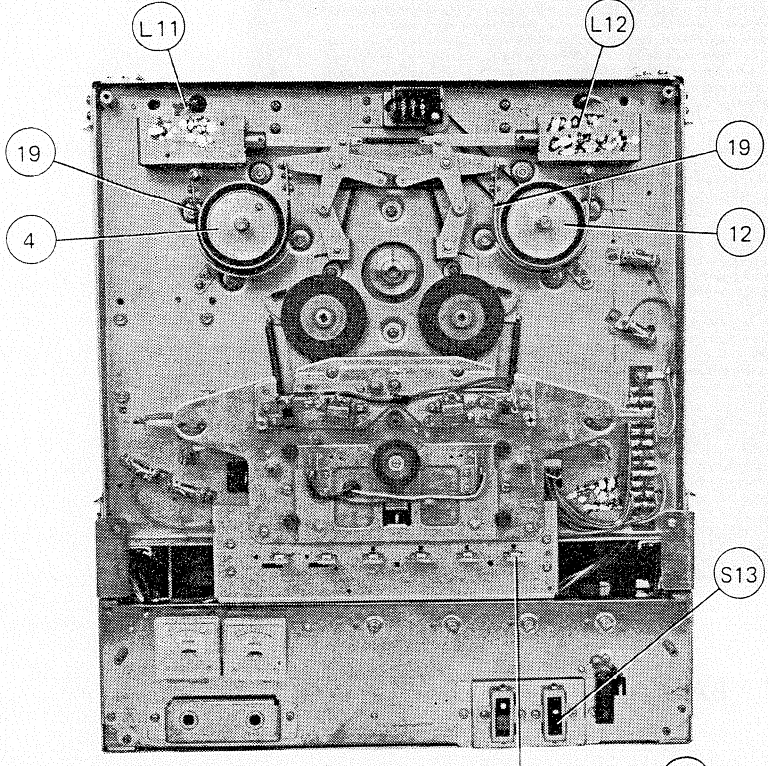


Figure 6

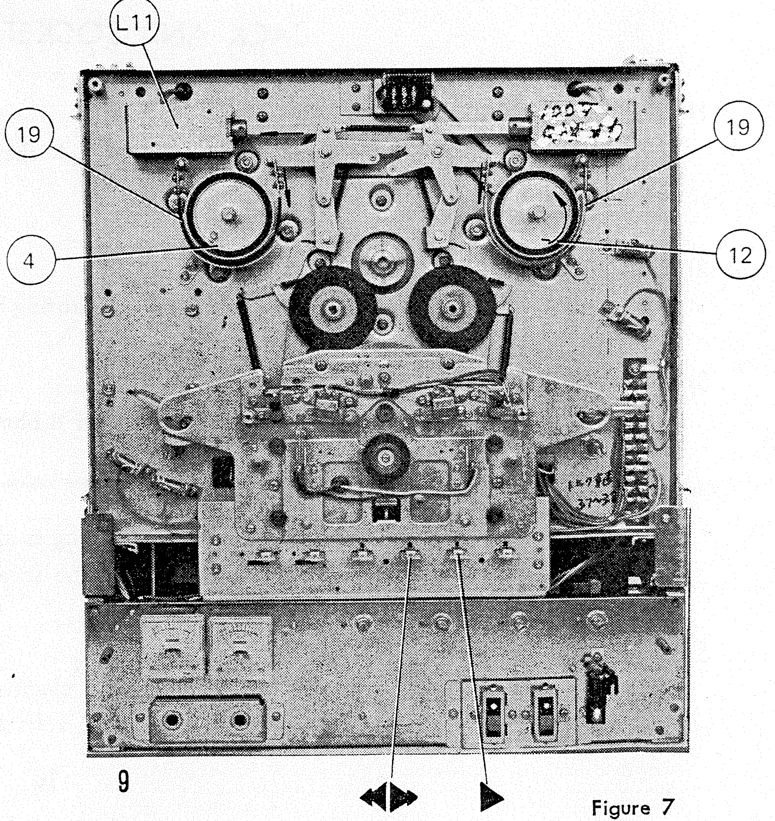
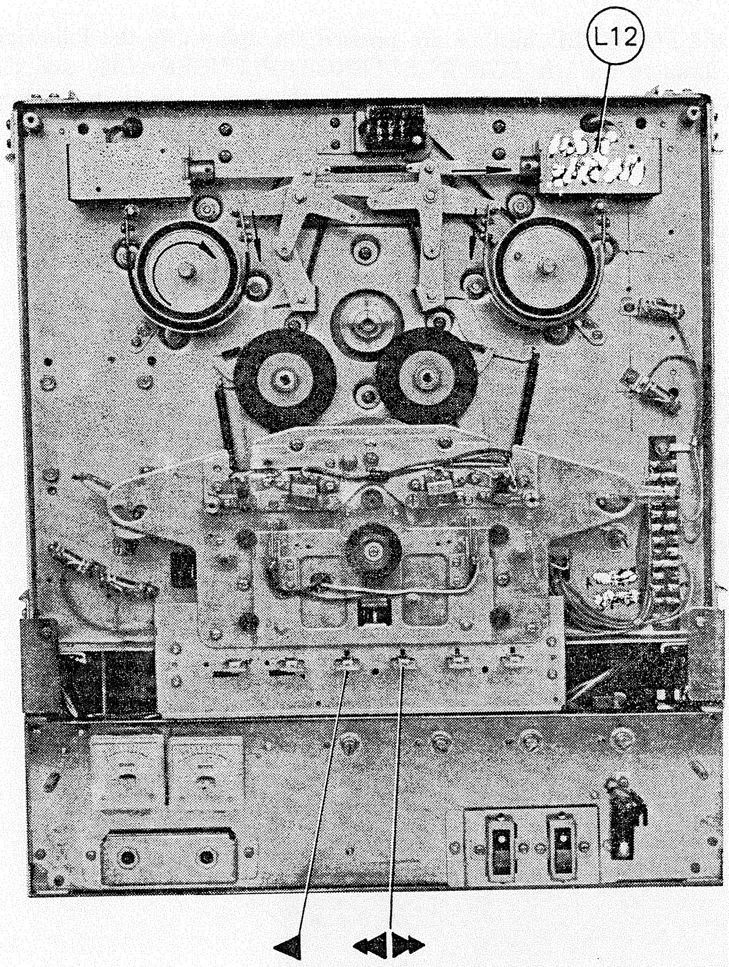


Figure 7



FAST BACKWARD Figure 8

JACK AND SOCKET OPERATIONS

1) Microphone Jacks

These jacks are provided for direct recording through channel 1 and (or) channel 2 using dynamic microphones of 10K ohm impedance.

2) Earphone Jacks

These jacks are provided for private listening or monitoring by connecting earphones of 8 ohm voice coil impedance.

3) Speaker Jacks

These jacks are provided for connecting speakers of 8 ohm voice coil impedance.

4) Headphone Jack

This stereo headphone jack is provided for connecting a stereo headphone having 8 ohm voice coil impedance. When the stereo headphone is connected to this jack, the speaker connections are automatically opened.

5) Line In Sockets

These sockets permit direct recording through both channel 1 and channel 2 from a radio or phono. The output level of a radio or phono should be approximately 0.1-2 volts and output impedance less than 500K ohms.

6) Line Out Sockets

These sockets are provided for both channel 1 and 2 to permit the output of this recorder to be played throug an external amplifier and speaker system. The output of the external amplifier should be less than 0.5 volts wit input impedance less than 50K ohms. When an external amplifier is connected the internal amplifier of this recorde is also operating. The LINE OUT sockets, however, are not connected to the VOLUME or TONE controls (R235 R236, R237, R238). These controls should be set in minimum position.

7) Integrated Record/Playback Socket (DIN Socket)

This socket is provided for direct recording or playback through an external amplifier and speaker system withou changing connections.

SWITCH OPERATIONS

1) Leaf Switch

1. The LEAF SWITCH (S6-1, 2) operates as a muting switch and cuts off the speaker connections in FAST FORWARD, FAST BACKWARD and STOP mode.
2. The LEAF SWITCH (S6-3) operates as a record safety switch. It turns on the oscillating circuit only in FORWAR or BACKWARD mode. In FAST FORWARD or FAST BACKWARD mode, it turns off the oscillating circuit an prevents the tape from being erased.

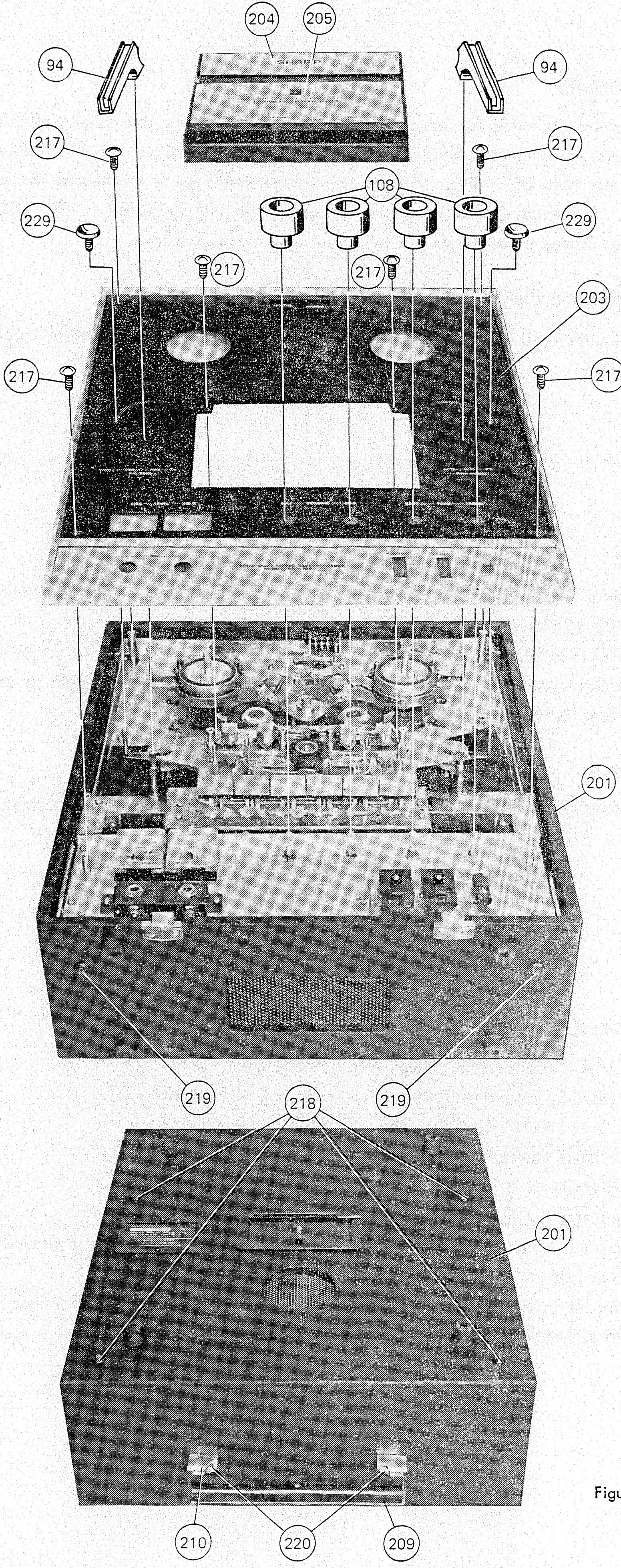
2) Rotary Switch

This switch operates as a record/playback equalizer switch, it is interlocked with the SPEED SELECTOR switc (S3).

DISASSEMBLY

1) Mechanism Assembly Removal (Refer to Figure 9)

1. Remove the VOLUME, BASS, TREBLE control knobs (108).
2. Remove the MODE SELECTOR and SPEED SELECTOR knobs (94).
3. Remove the screws (111) retaining the TENSION ARMS.
4. Remove the HEAD COVERS (112, 113).
5. Remove the 6 screws retaining the FRONT PANEL (114).
6. Slightly lift up and remove the PANEL.
7. Place the recorder in a vertical position and remove the 4 MECHANISM CHASSIS retaining screws located o the back of the cabinet.
8. Place the recorder in a horizontal position and remove the HANDLE retaining screws on the top and the MECHANISM CHASSIS retaining screws on the bottom of the cabinet.


204
205
SHARP
94
94
217
217
108
229
229
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203
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201
219
218
219
201
210
220
209

Figure 9

2) Record/Playback Circuit & Jack (Refer to Figure 10)

1. Remove the 6 CONTROL BRACKET retaining screws and lift up the CONTROL BRACKET (112) backward. Place the set with the left-hand side down. The record/playback circuits and the jack assemblies are now accessible for repair.

   Note : Be careful not to jar or damage the SOUND ON SOUND switch located on the side of the cabinet.

   For further repair all the plugs should be disconnected.

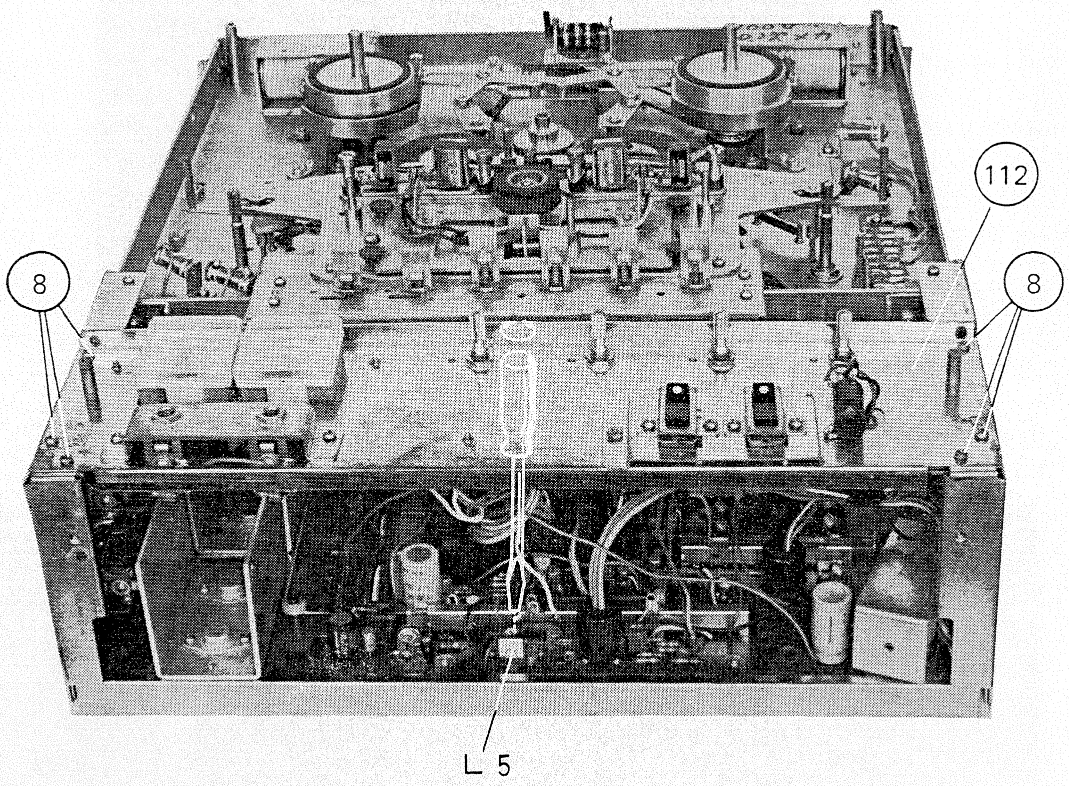


Figure 10

3) Power & Mechanism Drive Board (Refer to Figure 11)

Remove the 4 screws (91) retaining the POWER & MECHANISM DRIVE BOARD. Turn over the BOARD backward about 90°. The BOARD is now accessible for repair. If necessary, unsolder the leadwires of the ACTION SOLENOID PLUNGERS (L11, L13).

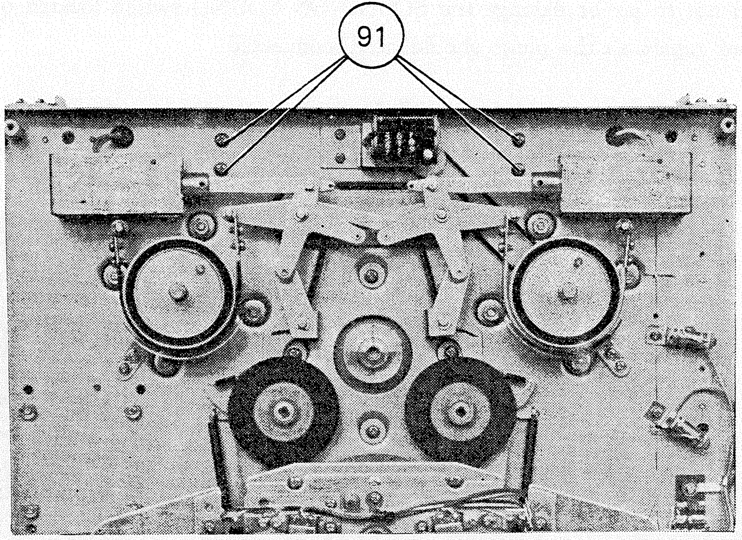


Figure 11

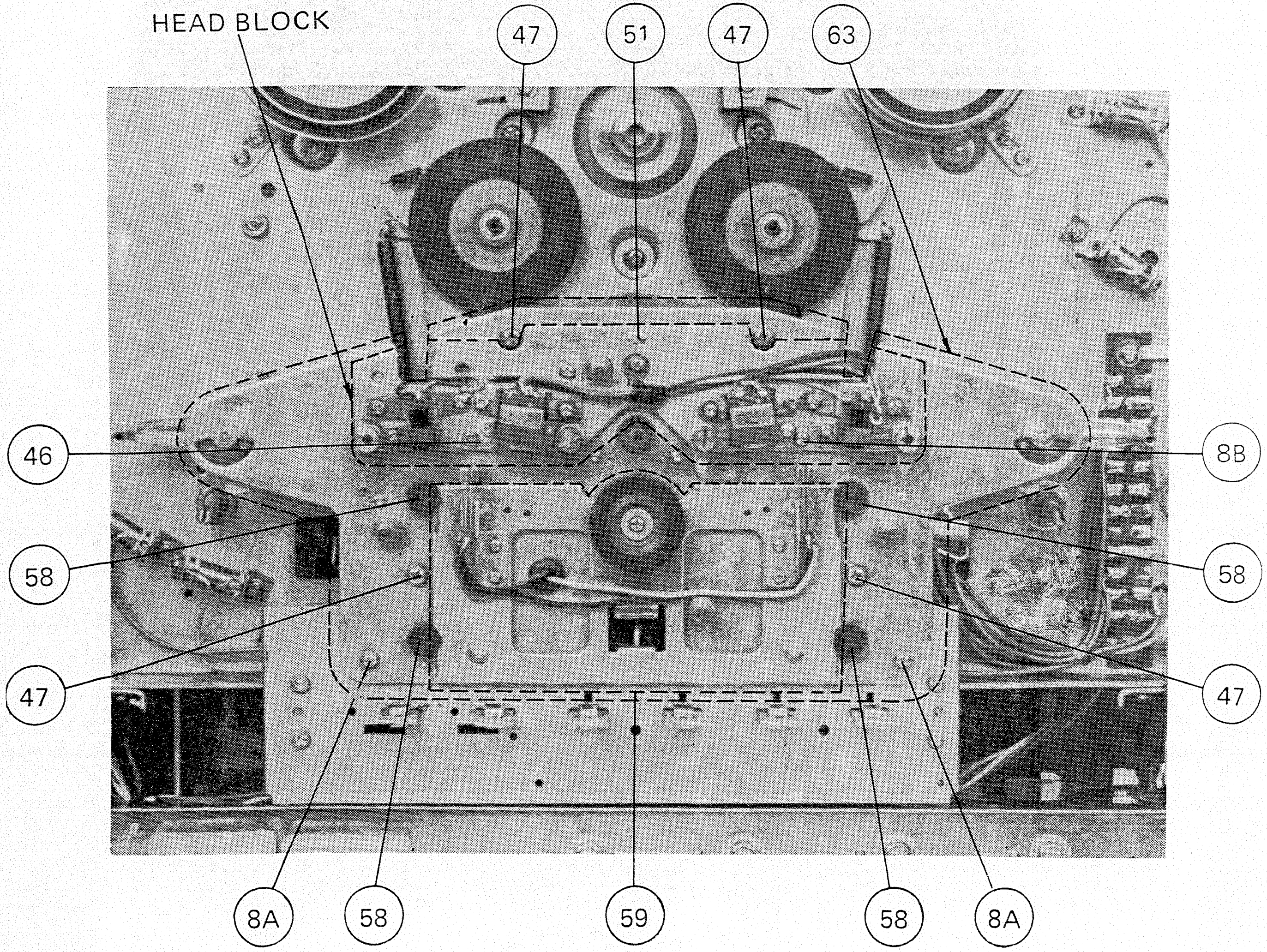

HEAD BLOCK
47
51
47
63
46
8B
58
58
47
47
8A
58
59
58
8A

Figure 12

4) Sub-Chassis Block Removel (Refer to Figure 12)

1. Remove the 6 screws (47 and 8A) mounting the SUB-CHASSIS BLOCK. If necessary, unsolder the leadwires of the HEADS.
2. Carefully lift up the BLOCK and remove it from the cabinet.

(Note: Be careful not to lose the ball bearings located beneath the FLYWHEEL.)

5) Head Block Removal (Refer to Figure 12)

Remove the 3 HEAD BLOCK retaining screws (8B, 46, 51) and the HEAD BLOCK. If necessary, unsolder the leadwires of the HEADS.

6) Slide Plate Removal (Refer to Figure 12)

Remove the 4 SLIDE PLATE retaining screws (58) and the SLIDE PLATE.

(Note: Be careful not to lose the 4 ball bearings (62) or bend the SLIDE PLATE.)

7) Motor Pulley Removal (Refer to Figure 13)

Unfasten the 2 MOTOR PULLEY retaining screws (86) with a 3 mm diameter hex-wrench. Pull off the MOTOR PULLEY (85).

8) Reel Spindle Removal (Refer to Figure 14)

Unfasten the 2 REEL SPINDLE retaining screws (6) with a 4 mm diameter hex-wrench. Pull off the REEL SPINDLES (4, 12).

9) Capstan Motor Removal (Refer to Mechanism Exploded Views.)

1) Remove the MOTOR PULLEY (85)
2) Remove the 4 MOTOR retaining nuts (65) and remove the CAPSTAN MOTOR (84) from the CHASSIS (95). If necessary, unsolder the leadwires of the motor and remove the 2 screws (8) retaining the lubrication tube holder.

10) Reel Motor Removal (Refer to Mechanism Exploded Views.)

1) Remove the REEL SPINDLES (4, 12).
2) Remove the 4 REEL MOTOR retaining nuts (65) and the REEL MOTORS. If necessary, unsolder the leadwires of the MOTOR and remove the 2 screws (8) retaining the lubrication tube holder.

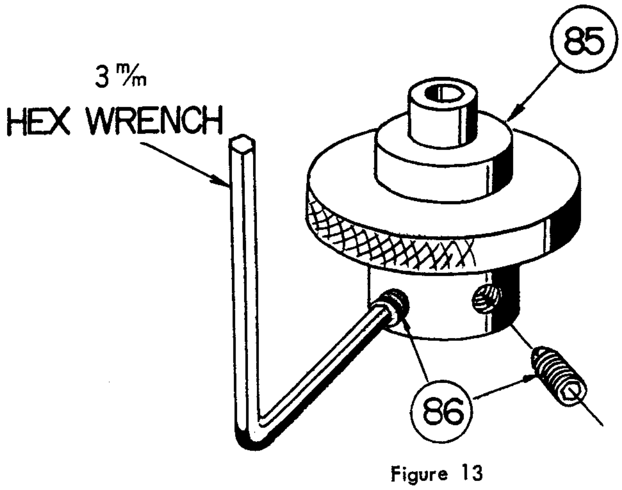


Figure 13

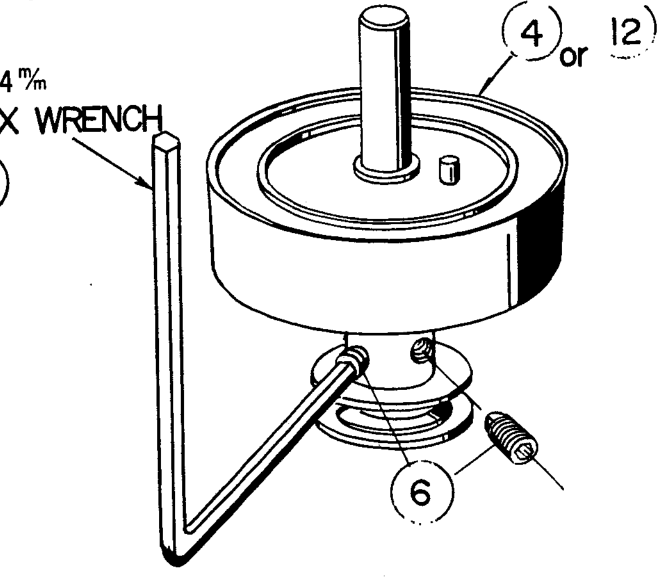


Figure 14

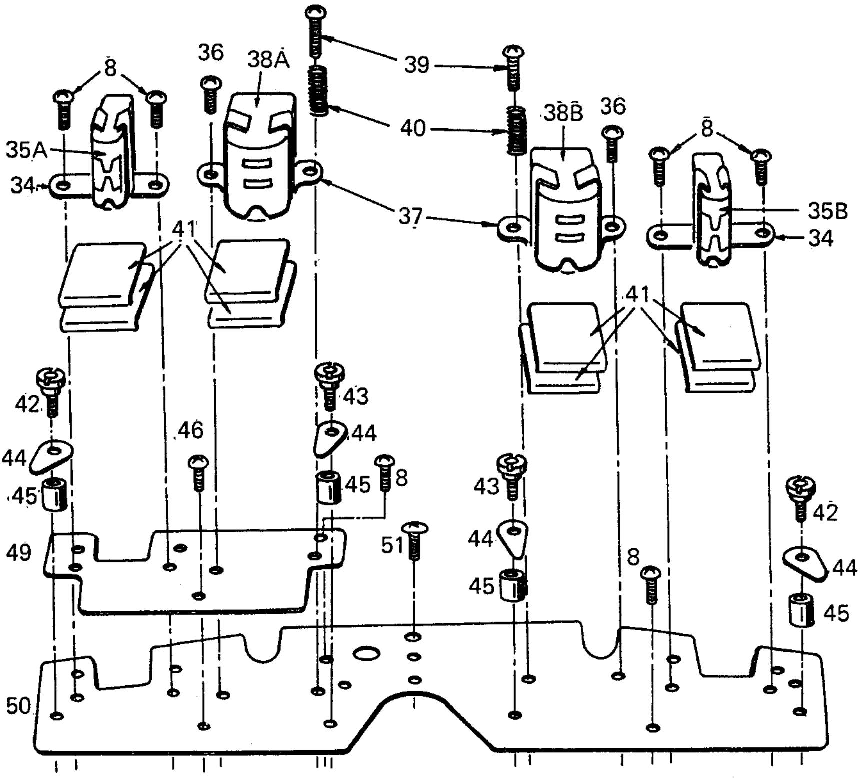
MECHANISM ADJUSTMENT

1) Record/Playback Head (Refer to Figure 15)

1. Thread a standard test tape and set the recorder in FORWARD PLAYBACK mode.
2. Adjust the screw (35) of the RECORD/PLAYBACK HEAD (38A) so as to obtain maximum output and best high frequency sound reproduction using the azimuth section of the test tape.
3. As for adjustment in FORWARD PLAYBACK mode, adjust the screw (36) of the RECORD/PLAYBACK HEAD (38B) in the same manner as in FORWARD PLAYBACK mode.

2) Head Height (Refer to Figure 15)

1. Thread a standard test tape on the recorder.
2. Set the recorder in FORWARD PLAYBACK mode. Adjust the height of the RECORD/PLAYBACK head with the SPACER (41) so as to obtain maximum output.
3. Thread a blank tape for test purposes and make a stereo recoding on it.
4. Disconnect all the input signal sources from the recorder and set the VOLUME controls (R235, R236) at minimum position. Then set the recorder in RECORD mode.
5. If the recording on the tape is not completely erased, adjust the height of the ERASE HEAD (35) with the SPACER (41).
6. Proceed as outlined in steps 2-5 in BACKWARD PLAYBACK mode.



41 {A .... BSP (t = 0.3 m/m)
B .... AIP (t = 0.2 m/m)
C .... BSP (t = 0.1 m/m)

Figure 15

3) Speed Changing Cam (Refer to Figure 16)

1. Set the SPEED SELECTOR knob (94) in the 3 3/4 ips position.
2. The line (Lc) passing the points "O2" and "C" should be parallel with the center line (Ld) of the MECHANISM chassis. Adjust ths length of the CAM CONNECTING ROD (156) by bending it with round pliers.
3. Adjust the position of the SPEED SELECTOR CAM (148) so that the line (La) passing the points "O1" and "A" are parallel to line (Lb) passing the points "O2" and "B".
4. The line (Le) passing the points "O3" (on the SPEED CHANGING CAM) and "D" should be parallel with the center line (Ld) of the MECHANISM CONNECTING ROD by bending it with the round pliers.

4) Pinch Roller Pressure (Refer to Figure 17)

1. Install two 7″ reels each half wound with tape. Set the recorder in FORWARD PLAY mode at 7 1/2 ips tape speed.
2. Hook a loop of the spring scale at the PINCH ROLLER SHAFT and pull it into reverse direction of the tape. Measure the value at the point just when the tape stops runing. The value should be 1.2–1.6 Kg.
3. If the pressure is less than the above value, adjust the length of the PLUNGER LEVER by turning the ADJUSTING NUT.

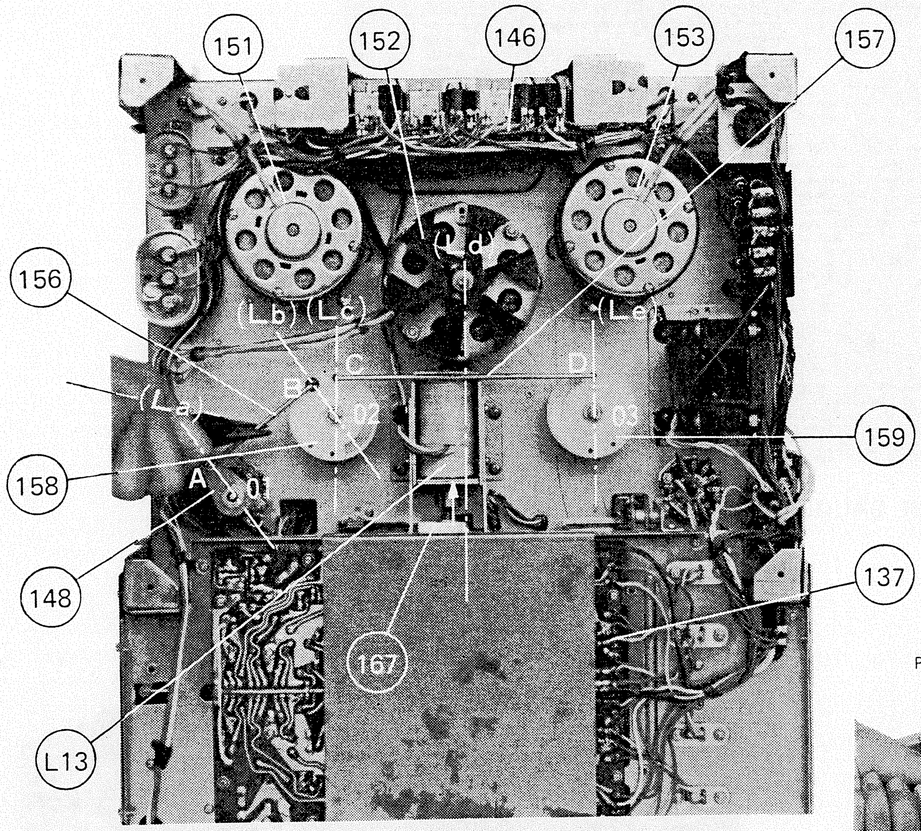


Figure 16

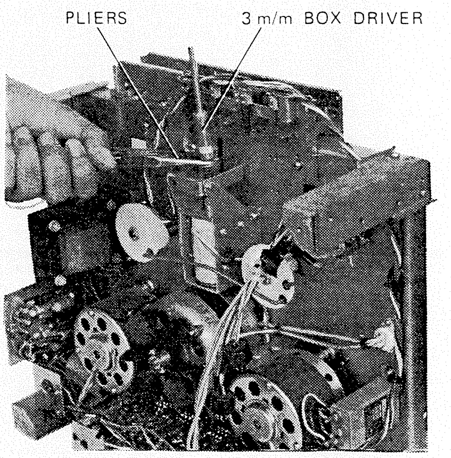


Figure 17

5) Action Solenoid Plungers (Refer to Figure 18)

1. Actuate the ACTION SOLENOID PLUNGERS (L11, L12) by pushing the FORWARD PLAY button.
2. Unfasten the 4 screws fixing the left ACTION SOLENOID PLUNGER (L11) and adjust their position so that the center of the ACTION LEVER PIN comes on the line passing through the IDLER CONNECTING SHAFT and the ACTION LEVER SHAFT. After normal positioning is obtained, refasten the 4 screws.
3. If the position of the ACTION SOLENOID PLUNGER is normal, the pressure of the IDLER is within 120–160g.
4. Complete the same adjustment steps as with the right ACTION SOLENOID PLUNGER (L12).

(Note: Measure the pressure of the IDLER with a tension gauge just when the tape stops running.)

6) Brake Guide Plate (Refer to Figure 19)

Unfasten the 2 screws fixing the BRAKE GUIDE PLATE (141) and slide the PLATE so that the BRAKE SHOES (19) are more than 0.5 mm from the REEL SPINDLES (4, 12) while either the left or right ACTION SOLENOID PLUNGERS (L11, L13) is operating.

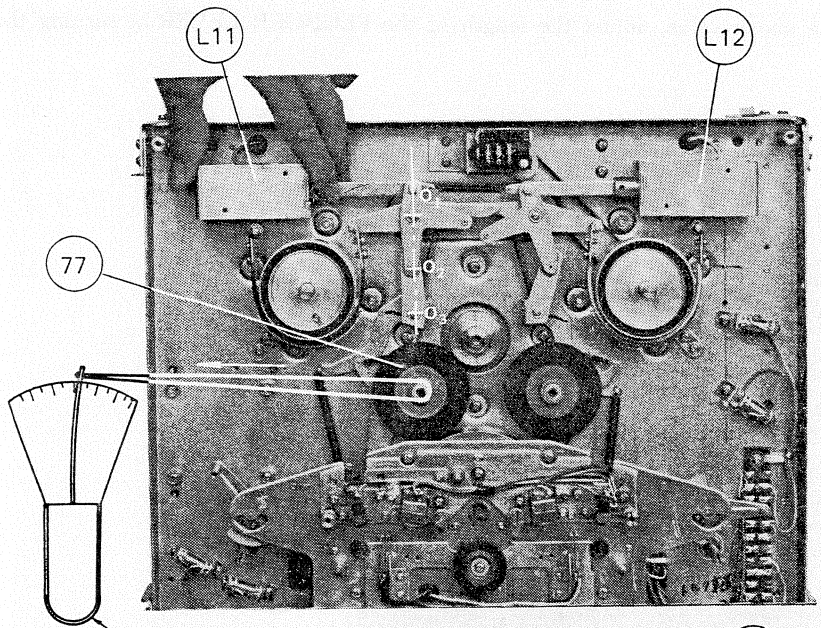


Figure 18

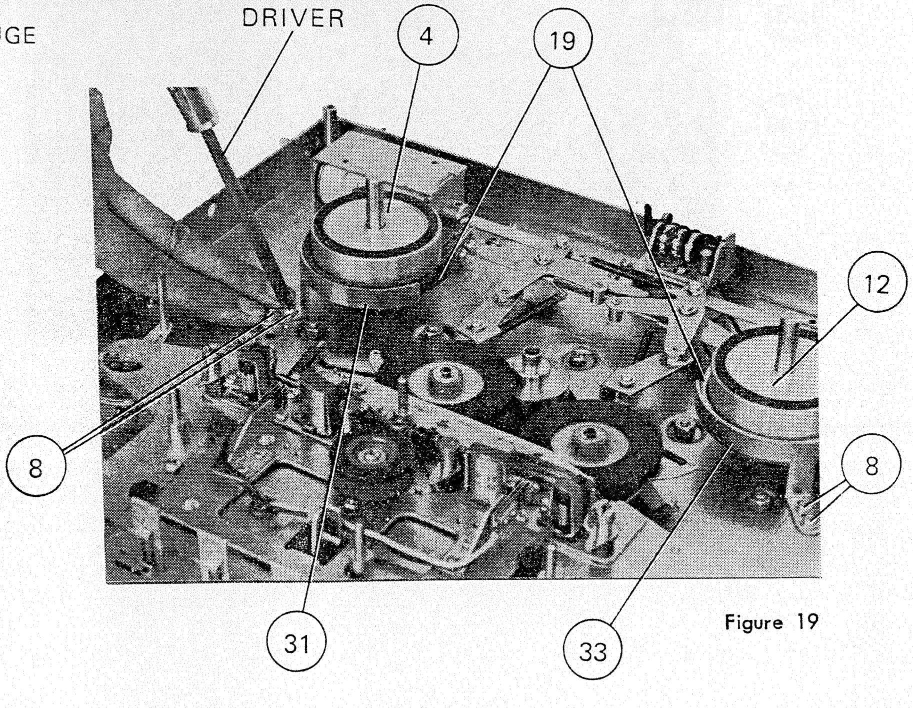


Figure 19

7) Shut-Off Switch (Refer to Figure 20)

1. Remove the SUB CHASSIS block and turn it over as shown in the figure.
2. Unfasten (it is not necessary to remove) the screw (8) fixing the SHUT OFF switch (S12).
3. Slide the switch so that its contacts are opened by 0.5–1.0 mm when the TENSION ARMS are fully opened. If normal switch position is obtained, refasten the screw (8) fixing the switch.

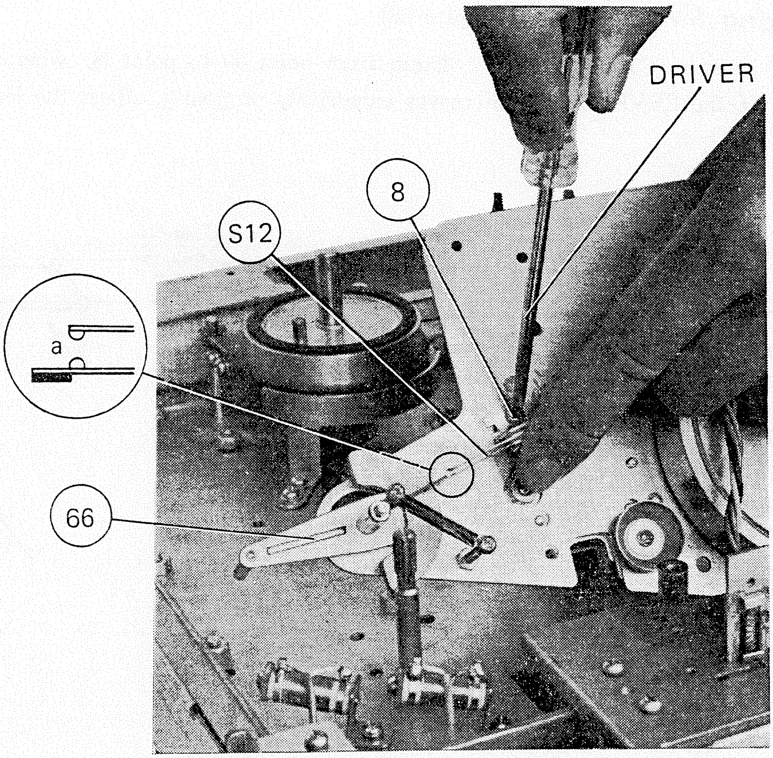


Figure 20

8) Push Button Switch (Refer to Figure 21)

1. The space of part ⓐ should be 1–2 mm and part ⓑ 0.5–1.5 mm. Unless they are in the above range, adjust the frame by bending it by the section near the switch.
2. The contacts B, C and D of switches Ⓑ, Ⓒ and Ⓓ should be opened by 0.5–1.5 mm.
3. The contacts B1 of the switch Ⓑ should be opened more than B2. The contacts of D1 should also be opened more than D2.
4. Adjustment of the contact space may be performed by bending the lever of the switches.

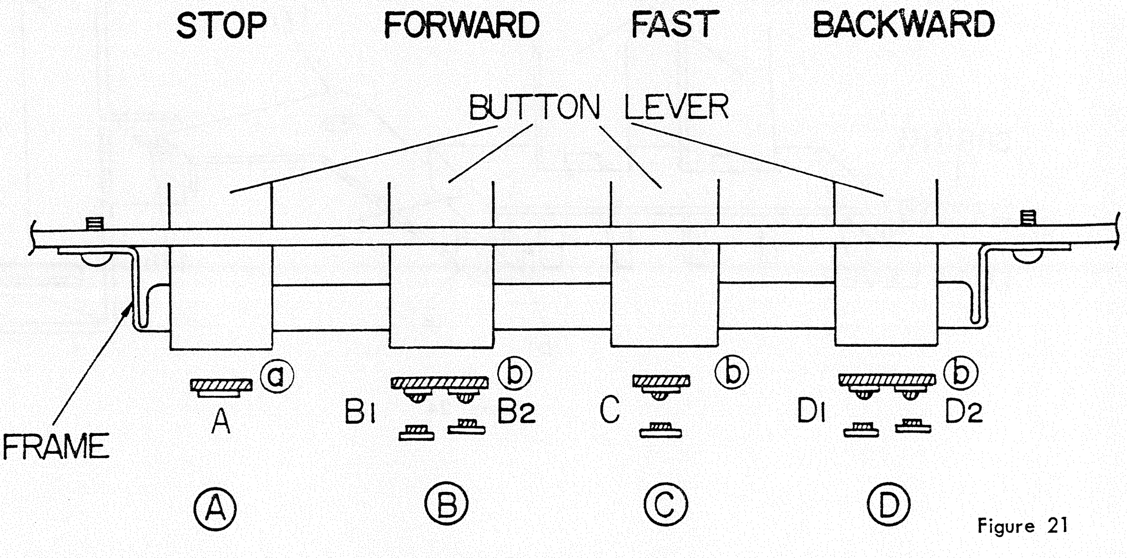


Figure 21

9) Muting Switch & Record Safety Switch (Refer to Figure 22)

1. In STOP mode, the contacts ⓐ of the RECORD SAFETY switch (S6-3) should be opened by 0.5-1 mm. The MUTING switch (S6-1, 2) should be closed.
2. In STOP mode (the PINCH ROLLER SHIFTING LEVER is fully pressed), the contacts ⓑ of the MUTING switch (S6-1, 2) should be opened by 0.5-1 mm. At the same time the RECORD SAFETY switch should be closed.

10) Head Changing Switch (Refer to Figure 23)

The REVERSE switch (S3) should move 45mm from point ⓐ to point ⓑ when the PLUNGER is fully pushed with your finger. If the REVERSE switch moves excessively or poorly, adjust the length of the ROD by bending it at point ⓑ.

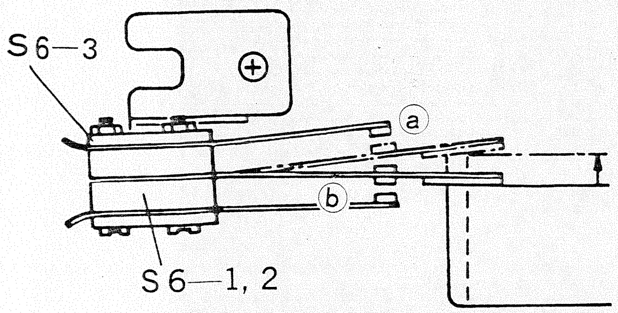


Figure 22

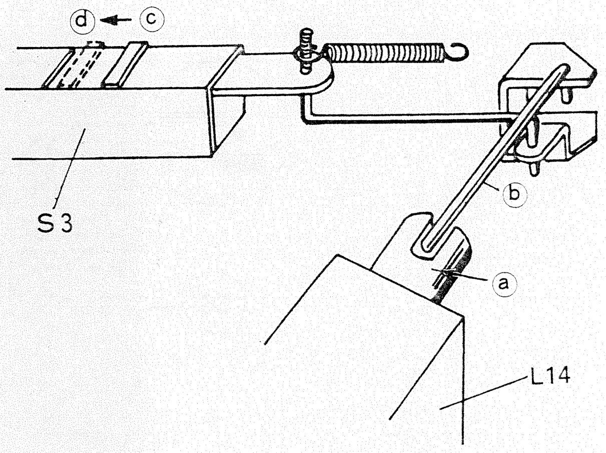


Figure 23

11) Record Buttons (Refer to Figure 24)

In STOP mode, the LOCK LEVER is pulled into the direction of the arrow ① by the spring.
Adjust the RECORD CONNECTING LEVER (177) so that the space between the ⓒ part of the LOCK LEVER and the ⓐ part of RECORD CONNECTING LEVER (177) is 0.5 mm by bending it at point ⓐ.

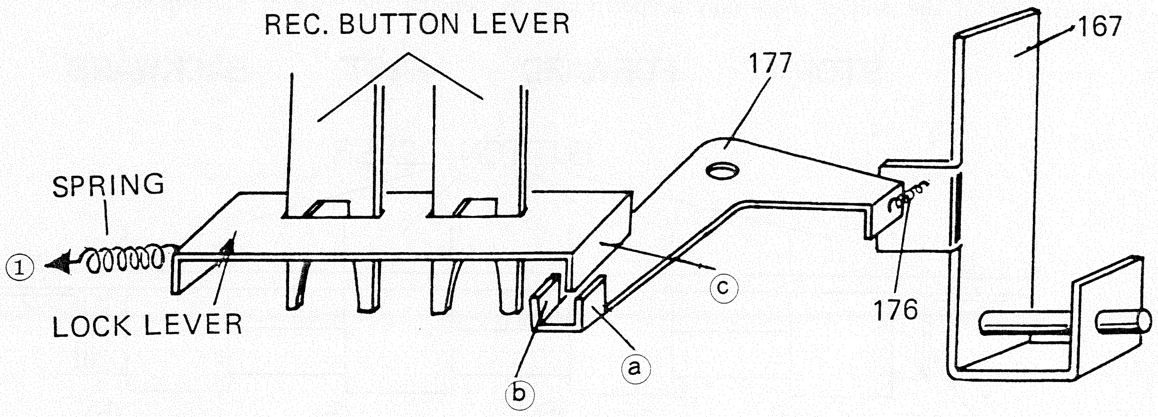


Figure 24

12) Record/Playback Switch (Refer to Figure 25)

Slowly press the CH-1 and CH-2 RECORD buttons and adjust the length of the connecting strings by rotating the adjusting nut (139) of the ROD (179) so that the RECORD/PLAYBACK switches (S1, S2) moves at a 4 mm stroke. When the RECORD buttons are unlocked, the RECORD/PLAYBACK switch should return to the end of the STOPPER.

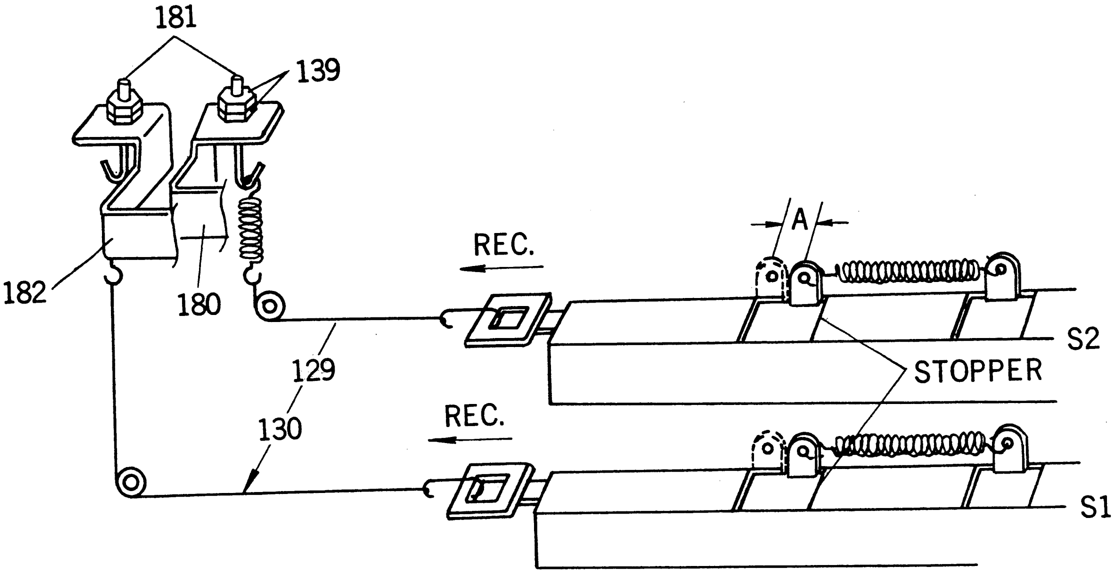
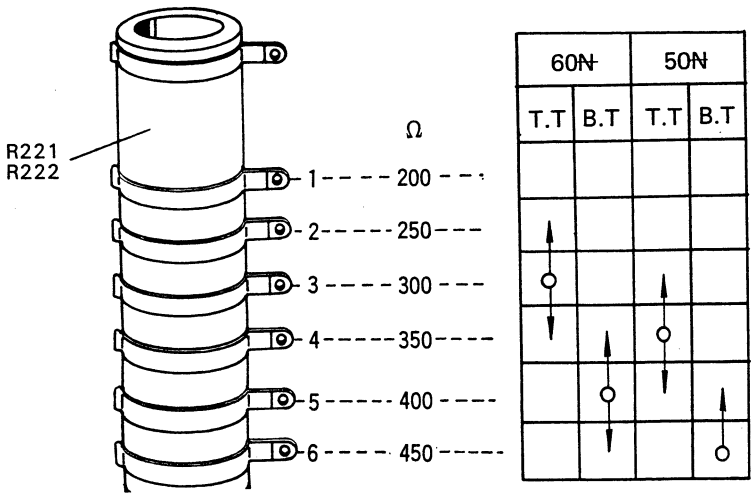


Figure 25

13) Back Tension & Take-Up Torque (Refer to Figure 26)

1. How to measure
   Install 7″ reels on the REEL SPINDLES. Hook a tension gauge at 3 3/16″ from the center of the reel.
2. In FORWARD PLAY mode, the take up torque of the right reel should be 20–26g and the back tension of the left reel 24–30g.
3. The circled values of table 1 are standard. If they exceed this value, shift the terminal of the fixed resistor for more resistance, if below, for less resistance.



Ω	60N T.T	60N B.T	50N T.T	50N B.T
200				
250	↑			
300	○		↑	
350	↓	↑	○	
400		○	↓	↑
450		↓		○

Figure 26

ELECTRICAL CIRCUIT ALIGNMENT

1) Playback Sensitivity Adjustment (Refer to Figure 27 and Figure 28)

1. Connect an 8 ohm dummy resistor across the SPEAKER jack of each channel.
2. Install a standard test tape recorded 1000 Hz signal on all four tracks and set the recorder in FORWARD PLAY mode with the VOLUME, BASS, TREBLE controls at maximum.
3. Connect an AC VTVM across the CH-1 dummy resistor and then to the CH-2 resistor. Adjust the fixed resistor (R232) for adjusting sensitivity so that the output level of the CH-2 is equal to that of CH-1.
4. Set the recorder in BACKWARD PLAY mode and proceed with the steps as outlined in FORWARD PLAY mode. The fixed resistors (R231, R234) should be adjusted to obtain equal channel outputs.

(Note: Unless the standard test tape is available, connect an Audio Signal Generator for 1,000 Hz, −68dB (=0.4mV, 0 dB=1V) across the CH-1 and CH-2 terminals of the RECORD/PLAYBACK HEADS (38).)

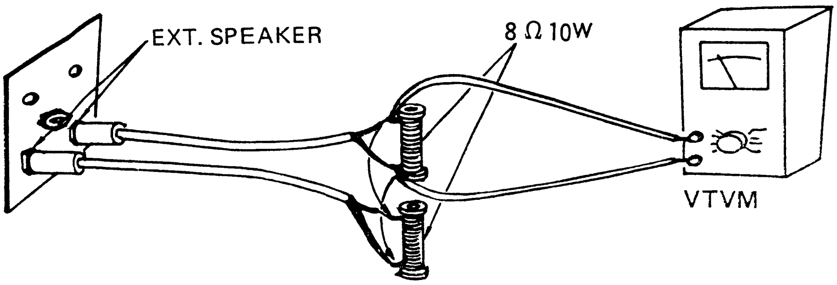


Figure 27

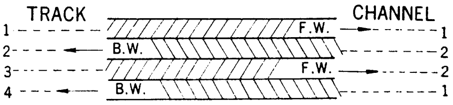


Figure 28

2) Record Sensitivity (Refer to Figure 29)

1. Set the recorder in STEREO RECORD mode.
2. Insert a piece of paper between the contacts of the RECORD SAFETY switch to stop bias oscillation.
3. Connect a 100 ohm resistor across the RECORD/PLAYBACK HEAD (38).
4. Connect an AC VTVM across the 100 ohm resistor.
5. Supply an input signal of 1,000 Hz, −60dB through the SPEAKER jacks and adjust the VOLUME controls so that the readings on the VTVM are 6mV.
6. In this condition, adjust the fixed resistors (for CH-1: R-239, for CH-2: R240) for "0" on the LEVEL METERS (M1, M2).

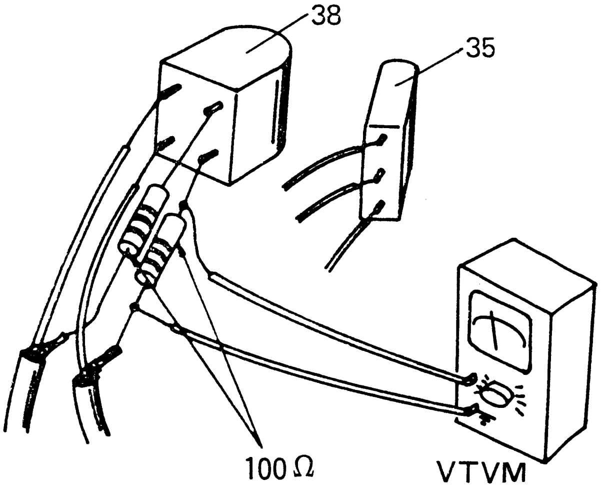


Figure 29

3) Bias Trap Coil

1. Set the unit in RECORD mode with the VOLUME controls at minimum. (It is not necessary to install a tape.)
2. Connect an AC VTVM across the MUTING switch terminals ⓒ, ⓓ (Refer to the Schematic Diagram) and the ground.
3. In this condition, rotate the core of the TRAP COILS (L5, L6) for minimum reading on the VTVM with a non-metallic alignment screw driver.

(Note: If the bias oscillation frequency is too far from normal value, the minimum VTVM reading cannot be obtained. Refer to "Bias Current Adjustment").

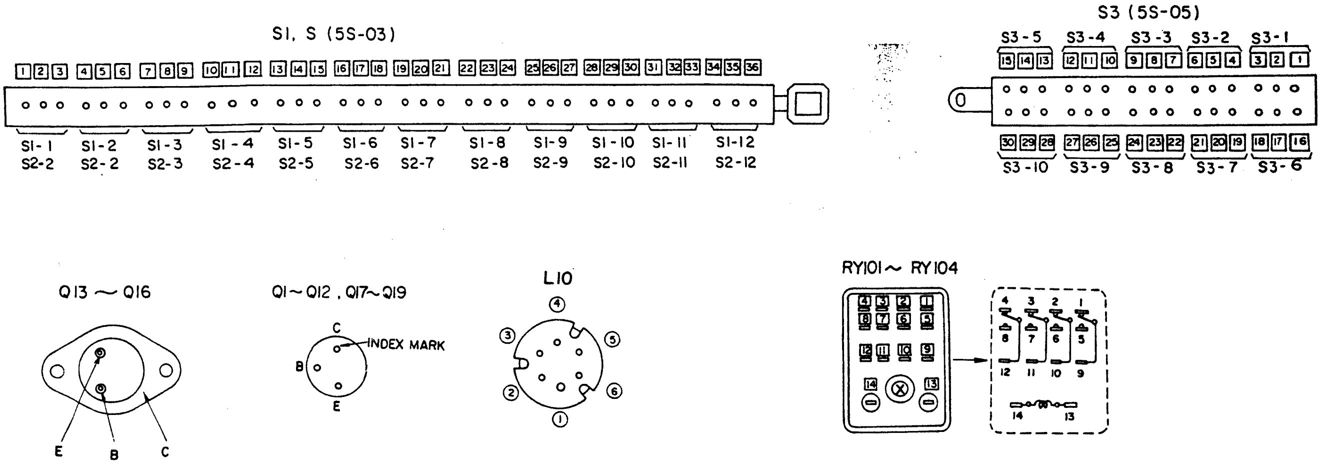
4) Bias Current

1. Set the recorder in STEREO RECORD mode.
2. Connect a 100 ohm resistor (1/2W, 5%) across the RECORD/PLAYBACK HEAD (38) and an AC VTVM across the resistor.
3. Adjust the fixed resistors (R241, R242, R243, R244) for 10 mV reading on AC VTVM playing back each channel.

(Notes: Repeat adjustments to insure good results)

5) Erase Current

1. Set the recoder in STEREO RECORD mode.
2. Connect an AC VTVM across the resistor R161 (1 ohm, 1/2W) located on the P.C. Board.
3. The reading on the VTVM should be approximately 100 mV.


S1, S (5S-03)
S1-1 S2-2
S1-2 S2-2
S1-3 S2-3
S1-4 S2-4
S1-5 S2-5
S1-6 S2-6
S1-7 S2-7
S1-8 S2-8
S1-9 S2-9
S1-10 S2-10
S1-11 S2-11
S1-12 S2-12
S3 (5S-05)
S3-5
S3-4
S3-3
S3-2
S3-1
S3-10
S3-9
S3-8
S3-7
S3-6
Q13 ~ Q16
E
B
C
Q1~Q12, Q17~Q19
C
INDEX MARK
B
E
L10
RY101 ~ RY104

TERMINAL GUIDE

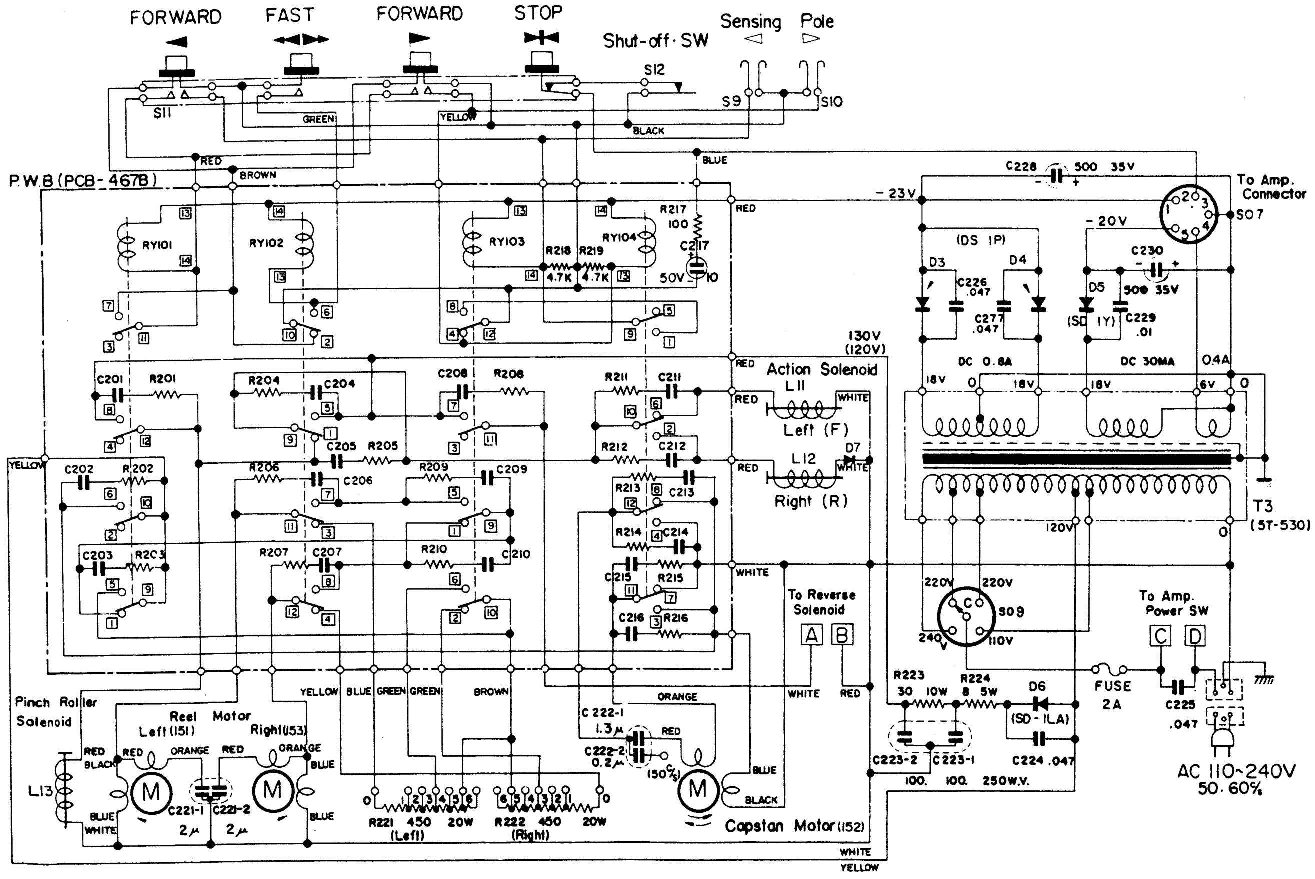
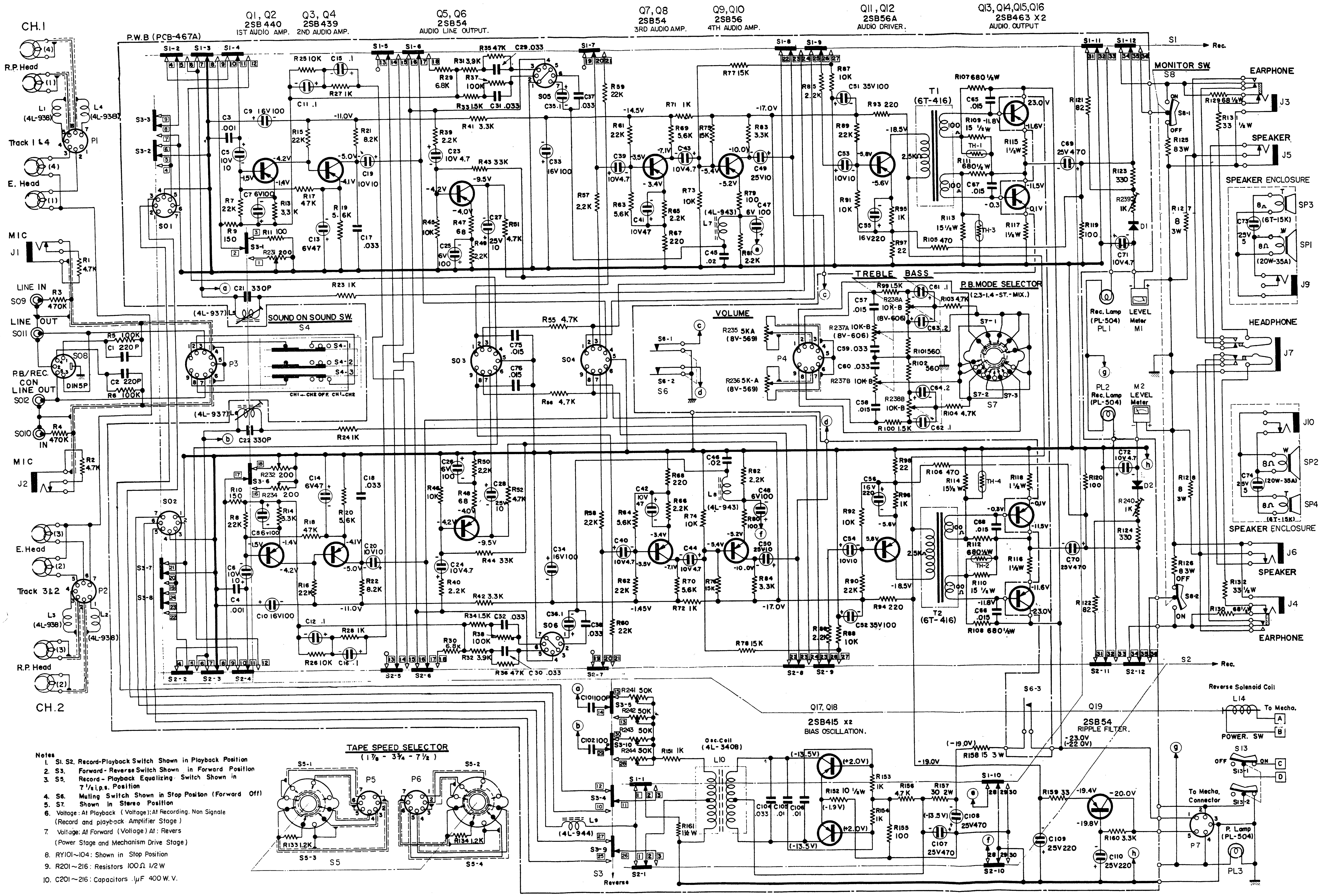

FORWARD
FAST
FORWARD
STOP
Shut-off·SW
S12
Sensing Pole
S9
S10
S11
GREEN
YELLOW
BLACK
RED
BROWN
BLUE
P.W.B (PCB-4678)
RY101
RY102
RY103
RY104
R217 100
C217
50V 10
R218 4.7K
R219 4.7K
C201
R201
C202
R202
C203
R203
R204
C204
C205
R205
R206
C206
R207
C207
C208
R208
R209
C209
R210
C210
R211
C211
R212
C212
R213
C213
R214
C214
C215
R215
C216
R216
130V (120V)
Action Solenoid
L11
Left (F)
L12
D7
Right (R)
WHITE
To Reverse Solenoid
A
B
C228 500 35V
-23V
-20V
To Amp. Connector
SO7
(DS 1P)
D3
D4
D5
C226 .047
C227 .047
C229 .01
C230 50 35V
DC 0.8A
DC 30MA
04A
18V
6V
120V
T3 (5T-530)
220V
240V
110V
SO9
To Amp. Power SW
C
D
R223 30 10W
R224 8 5W
D6 (SD-1LA)
FUSE 2A
C225 .047
C223-2
C223-1
100. 100. 250W.V.
C224 .047
AC 110~240V 50·60%
Pinch Roller Solenoid
L13
Reel Motor
Left (151)
Right (153)
ORANGE
C221-1 2μ
C221-2 2μ
M
R221 450 20W (Left)
R222 450 20W (Right)
C222-1 1.3μ
C222-2 0.2μ
(50%)
Capstan Motor (152)
YELLOW

Figure 30 - a SCHEMATIC DIAGRAM

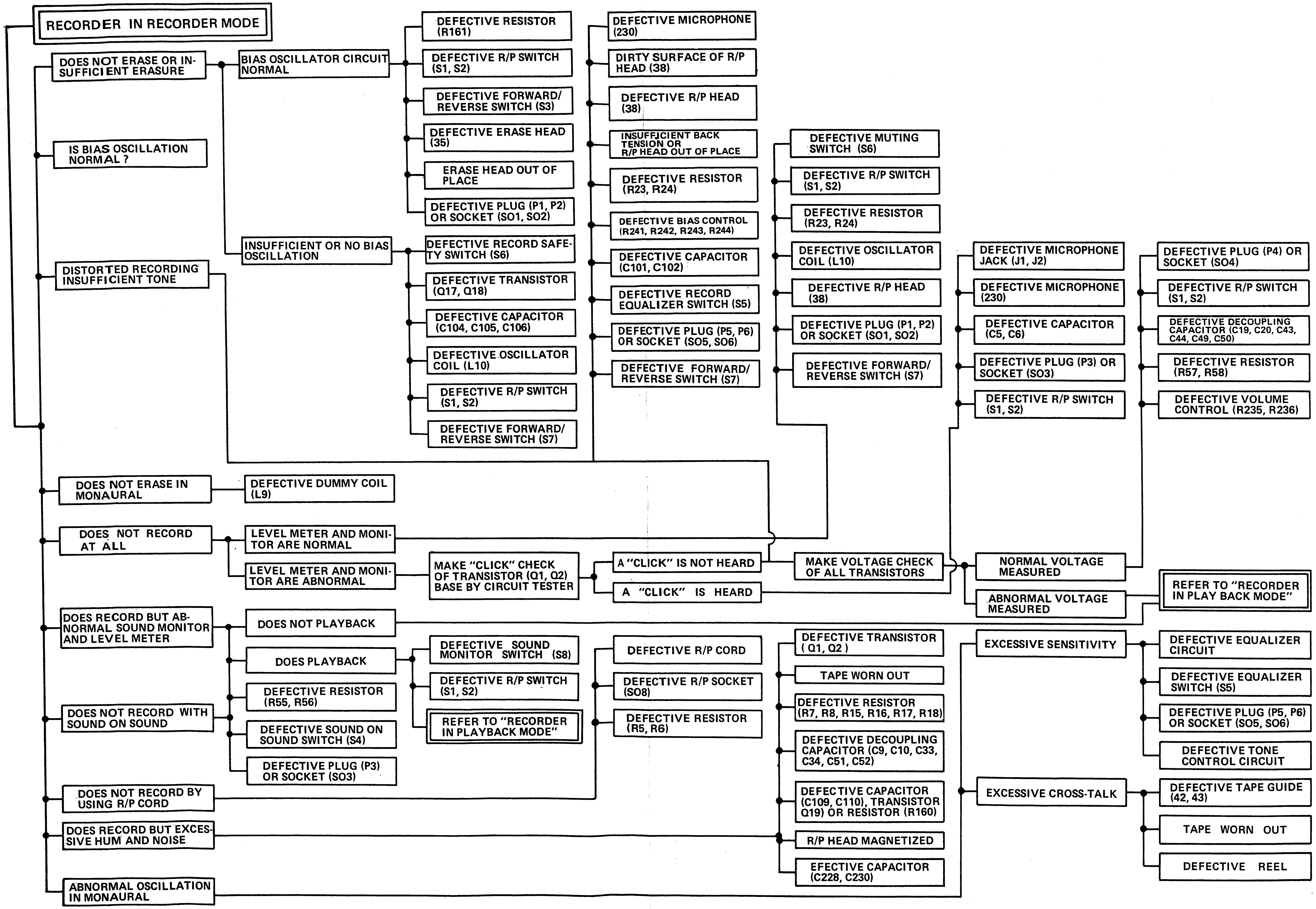

CH.1
CH.2
P.W.B (PCB-467A)
Q1, Q2 2SB440 1ST AUDIO AMP.
Q3, Q4 2SB439 2ND AUDIO AMP.
Q5, Q6 2SB54 AUDIO LINE OUTPUT.
Q7, Q8 2SB54 3RD AUDIO AMP.
Q9, Q10 2SB56 4TH AUDIO AMP.
Q11, Q12 2SB56A AUDIO DRIVER.
Q13, Q14, Q15, Q16 2SB463 X2 AUDIO OUTPUT
Q17, Q18 2SB415 x2 BIAS OSCILLATION.
Q19 2SB54 RIPPLE FILTER.
R.P. Head
E. Head
Track 1 & 4
Track 3 & 2
MIC
J1
J2
LINE IN
S09
LINE OUT
S011
P.B/REC. CON
LINE OUT
S012
S010
IN
SO8
DIN5P
SOUND ON SOUND SW.
S4
CH1-CH2 OFF CH1-CH2
VOLUME
S6
P4
TREBLE
BASS
P.B. MODE SELECTOR
(2.3-1.4-ST.-MIX.)
S7
T1 (6T-416)
T2 (6T-416)
MONITOR SW.
S8
EARPHONE
J3
SPEAKER
J5
SPEAKER ENCLOSURE
SP1
SP2
SP3
SP4
J9
HEADPHONE
J7
J10
J6
J4
Rec. Lamp (PL-504) PL1
LEVEL Meter M1
PL2 Rec. Lamp (PL-504)
M2 LEVEL Meter
S1 → Rec.
S2 → Rec.
TAPE SPEED SELECTOR
(1 7/8 - 3 3/4 - 7 1/2)
S5
P5
P6
Osc. Coil (4L-3408)
L10
Reverse Solenoid Coil
L14
To Mecha.
POWER. SW
S13
To Mecha. Connector
P7
P. Lamp (PL-504)
PL3
S3 Reverse

Notes

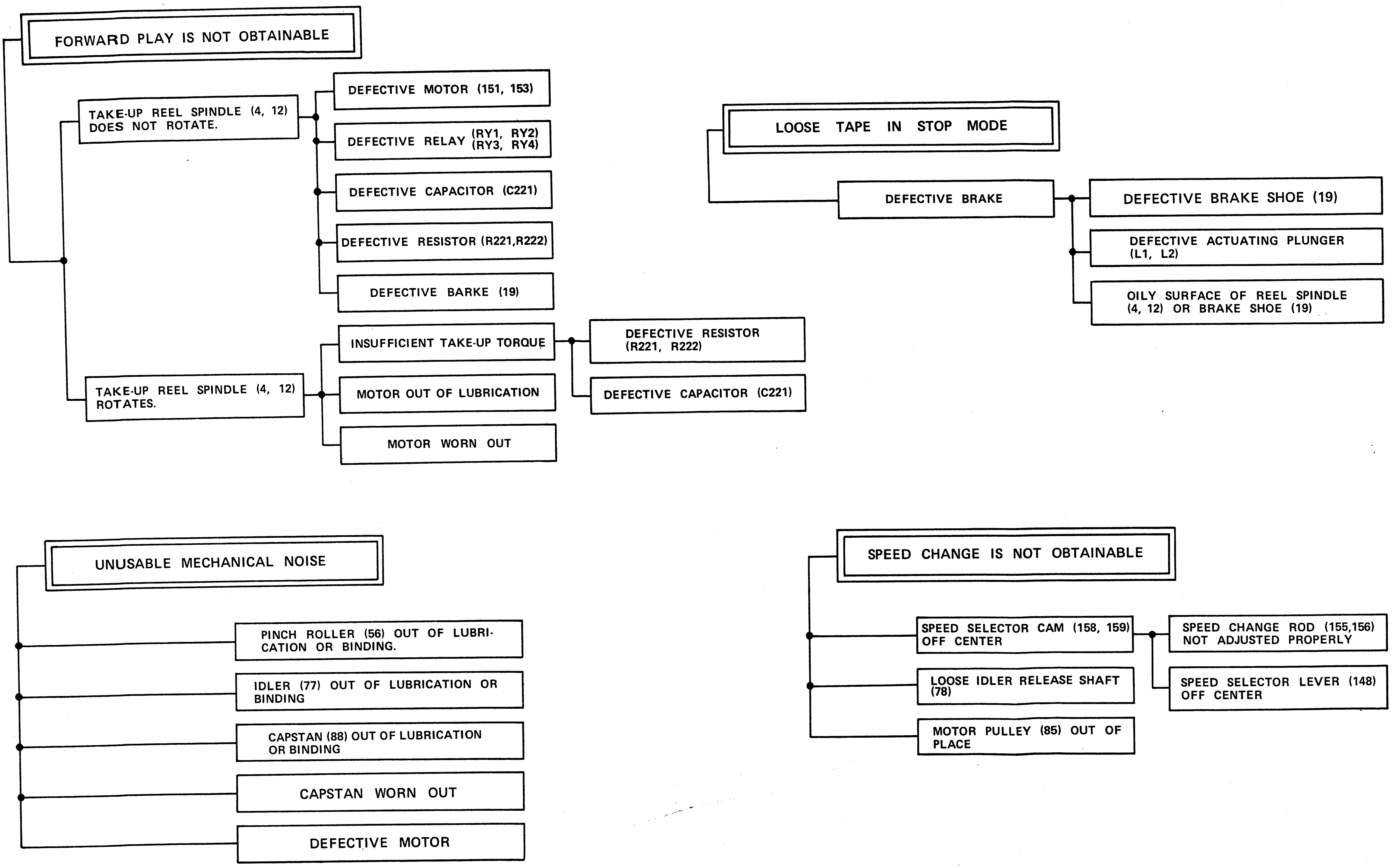
1. S1. S2. Record-Playback Switch Shown in Playback Position
2. S3. Forward - Reverse Switch Shown in Forward Position
3. S5. Record - Playback Equalizing Switch Shown in 7 1/2 i.p.s. Position
4. S6. Muting Switch Shown in Stop Positon (Forward Off)
5. S7. Shown in Stereo Position
6. Voltage : At Playback (Voltage): At Recording. Non Signale (Record and playback Amplifier Stage)
7. Voltage: At Forward (Voltage) At : Revers (Power Stage and Mechanism Drive Stage)
8. RY101~104 : Shown in Stop Position
9. R201~216 : Resistors 100Ω 1/2W
10. C201~216 : Capacitors .1μF 400 W. V.

Figure 30 - b SCHEMATIC DIAGRAM

TROUBLE CHART - 1


RECORDER IN RECORDER MODE
DOES NOT ERASE OR INSUFFICIENT ERASURE
BIAS OSCILLATOR CIRCUIT NORMAL
DEFECTIVE RESISTOR (R161)
DEFECTIVE R/P SWITCH (S1, S2)
DEFECTIVE FORWARD/ REVERSE SWITCH (S3)
DEFECTIVE ERASE HEAD (35)
ERASE HEAD OUT OF PLACE
DEFECTIVE PLUG (P1, P2) OR SOCKET (SO1, SO2)
IS BIAS OSCILLATION NORMAL ?
INSUFFICIENT OR NO BIAS OSCILLATION
DEFECTIVE RECORD SAFETY SWITCH (S6)
DEFECTIVE TRANSISTOR (Q17, Q18)
DEFECTIVE CAPACITOR (C104, C105, C106)
DEFECTIVE OSCILLATOR COIL (L10)
DEFECTIVE R/P SWITCH (S1, S2)
DEFECTIVE FORWARD/ REVERSE SWITCH (S7)
DISTORTED RECORDING INSUFFICIENT TONE
DEFECTIVE MICROPHONE (230)
DIRTY SURFACE OF R/P HEAD (38)
DEFECTIVE R/P HEAD (38)
INSUFFICIENT BACK TENSION OR R/P HEAD OUT OF PLACE
DEFECTIVE RESISTOR (R23, R24)
DEFECTIVE BIAS CONTROL (R241, R242, R243, R244)
DEFECTIVE CAPACITOR (C101, C102)
DEFECTIVE RECORD EQUALIZER SWITCH (S5)
DEFECTIVE PLUG (P5, P6) OR SOCKET (SO5, SO6)
DEFECTIVE FORWARD/ REVERSE SWITCH (S7)
DEFECTIVE MUTING SWITCH (S6)
DEFECTIVE R/P SWITCH (S1, S2)
DEFECTIVE RESISTOR (R23, R24)
DEFECTIVE OSCILLATOR COIL (L10)
DEFECTIVE R/P HEAD (38)
DEFECTIVE PLUG (P1, P2) OR SOCKET (SO1, SO2)
DEFECTIVE FORWARD/ REVERSE SWITCH (S7)
DEFECTIVE MICROPHONE JACK (J1, J2)
DEFECTIVE MICROPHONE (230)
DEFECTIVE CAPACITOR (C5, C6)
DEFECTIVE PLUG (P3) OR SOCKET (SO3)
DEFECTIVE R/P SWITCH (S1, S2)
DEFECTIVE PLUG (P4) OR SOCKET (SO4)
DEFECTIVE R/P SWITCH (S1, S2)
DEFECTIVE DECOUPLING CAPACITOR (C19, C20, C43, C44, C49, C50)
DEFECTIVE RESISTOR (R57, R58)
DEFECTIVE VOLUME CONTROL (R235, R236)
DOES NOT ERASE IN MONAURAL
DEFECTIVE DUMMY COIL (L9)
DOES NOT RECORD AT ALL
LEVEL METER AND MONITOR ARE NORMAL
LEVEL METER AND MONITOR ARE ABNORMAL
MAKE "CLICK" CHECK OF TRANSISTOR (Q1, Q2) BASE BY CIRCUIT TESTER
A "CLICK" IS NOT HEARD
A "CLICK" IS HEARD
MAKE VOLTAGE CHECK OF ALL TRANSISTORS
NORMAL VOLTAGE MEASURED
ABNORMAL VOLTAGE MEASURED
REFER TO "RECORDER IN PLAY BACK MODE"
DOES RECORD BUT ABNORMAL SOUND MONITOR AND LEVEL METER
DOES NOT PLAYBACK
DOES PLAYBACK
DEFECTIVE SOUND MONITOR SWITCH (S8)
DEFECTIVE R/P SWITCH (S1, S2)
REFER TO "RECORDER IN PLAYBACK MODE"
DOES NOT RECORD WITH SOUND ON SOUND
DEFECTIVE RESISTOR (R55, R56)
DEFECTIVE SOUND ON SOUND SWITCH (S4)
DEFECTIVE PLUG (P3) OR SOCKET (SO3)
DEFECTIVE R/P CORD
DEFECTIVE R/P SOCKET (SO8)
DEFECTIVE RESISTOR (R5, R6)
DOES NOT RECORD BY USING R/P CORD
DOES RECORD BUT EXCESSIVE HUM AND NOISE
ABNORMAL OSCILLATION IN MONAURAL
DEFECTIVE TRANSISTOR (Q1, Q2)
TAPE WORN OUT
DEFECTIVE RESISTOR (R7, R8, R15, R16, R17, R18)
DEFECTIVE DECOUPLING CAPACITOR (C9, C10, C33, C34, C51, C52)
DEFECTIVE CAPACITOR (C109, C110), TRANSISTOR Q19) OR RESISTOR (R160)
R/P HEAD MAGNETIZED
EFECTIVE CAPACITOR (C228, C230)
EXCESSIVE SENSITIVITY
DEFECTIVE EQUALIZER CIRCUIT
DEFECTIVE EQUALIZER SWITCH (S5)
DEFECTIVE PLUG (P5, P6) OR SOCKET (SO5, SO6)
DEFECTIVE TONE CONTROL CIRCUIT
EXCESSIVE CROSS-TALK
DEFECTIVE TAPE GUIDE (42, 43)
TAPE WORN OUT
DEFECTIVE REEL

TROUBLE CHART - 2



FORWARD PLAY IS NOT OBTAINABLE

- TAKE-UP REEL SPINDLE (4, 12) DOES NOT ROTATE.
  - DEFECTIVE MOTOR (151, 153)
  - DEFECTIVE RELAY (RY1, RY2)
(RY3, RY4)
  - DEFECTIVE CAPACITOR (C221)
  - DEFECTIVE RESISTOR (R221,R222)
  - DEFECTIVE BARKE (19)
- TAKE-UP REEL SPINDLE (4, 12) ROTATES.
  - INSUFFICIENT TAKE-UP TORQUE
    - DEFECTIVE RESISTOR (R221, R222)
    - DEFECTIVE CAPACITOR (C221)
  - MOTOR OUT OF LUBRICATION
  - MOTOR WORN OUT

LOOSE TAPE IN STOP MODE

- DEFECTIVE BRAKE
  - DEFECTIVE BRAKE SHOE (19)
  - DEFECTIVE ACTUATING PLUNGER (L1, L2)
  - OILY SURFACE OF REEL SPINDLE (4, 12) OR BRAKE SHOE (19)

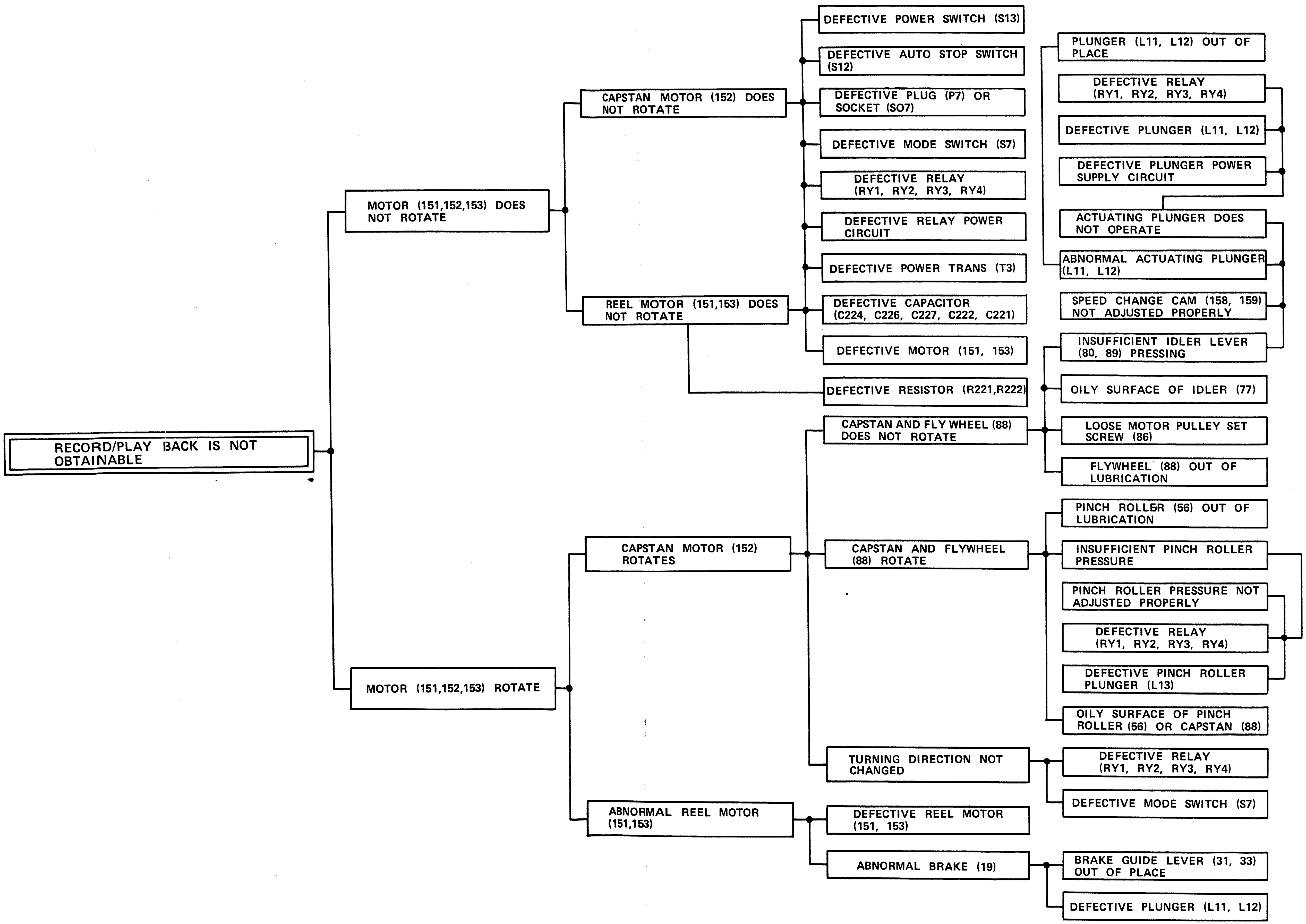
UNUSABLE MECHANICAL NOISE

- PINCH ROLLER (56) OUT OF LUBRICATION OR BINDING.
- IDLER (77) OUT OF LUBRICATION OR BINDING
- CAPSTAN (88) OUT OF LUBRICATION OR BINDING
- CAPSTAN WORN OUT
- DEFECTIVE MOTOR

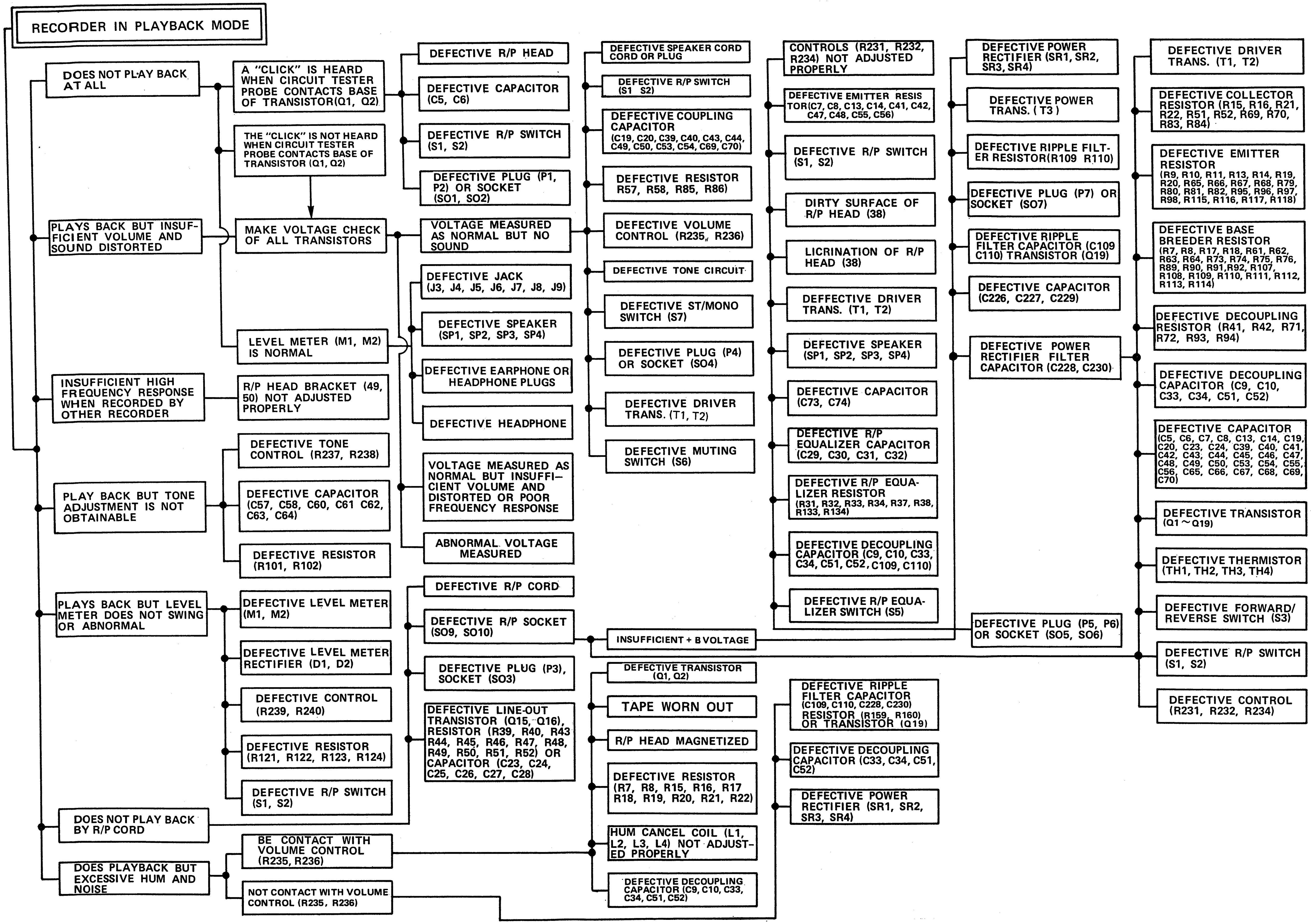
SPEED CHANGE IS NOT OBTAINABLE

- SPEED SELECTOR CAM (158, 159) OFF CENTER
  - SPEED CHANGE ROD (155,156) NOT ADJUSTED PROPERLY
  - SPEED SELECTOR LEVER (148) OFF CENTER
- LOOSE IDLER RELEASE SHAFT (78)
- MOTOR PULLEY (85) OUT OF PLACE

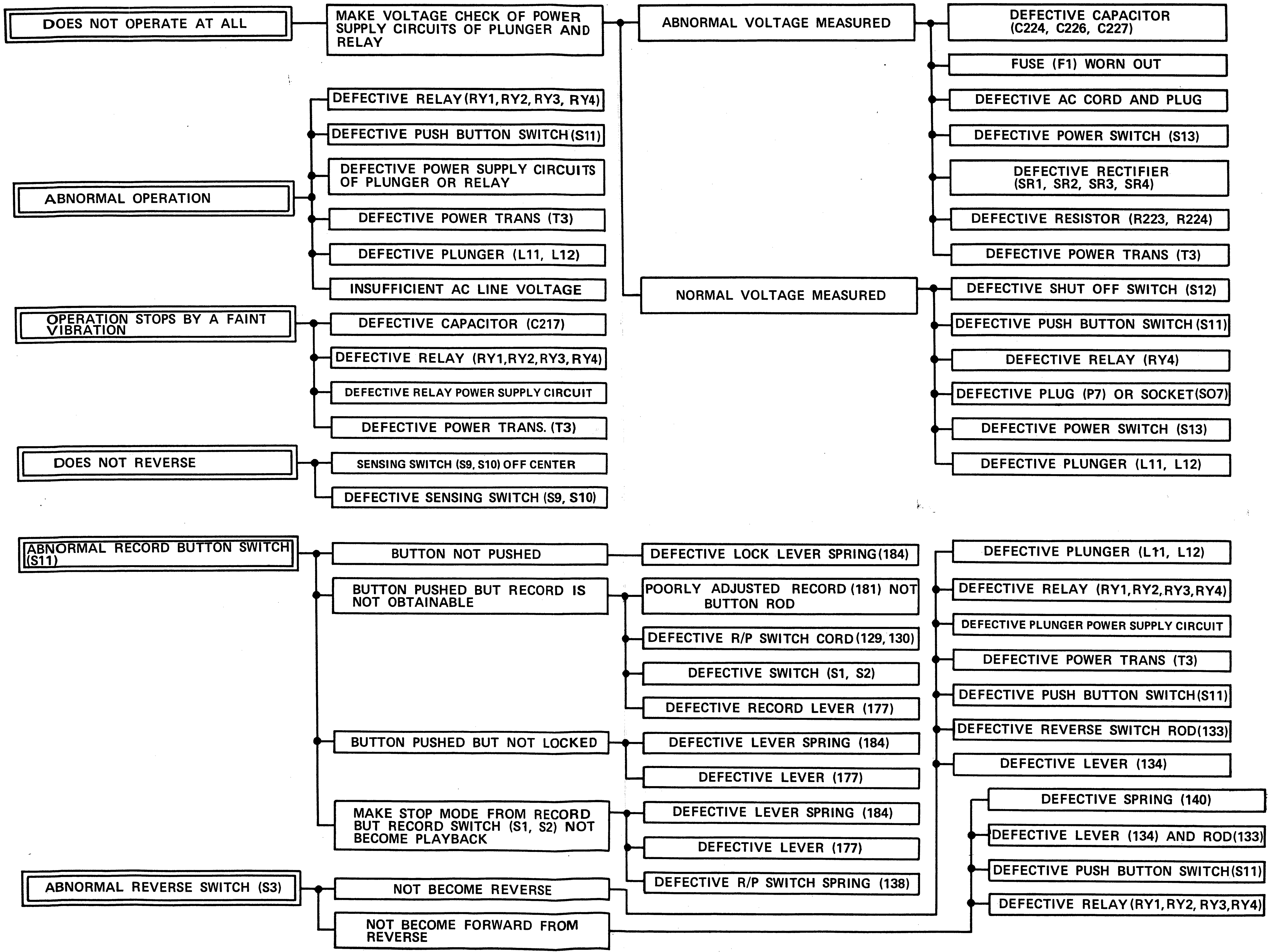
TROUBLE CHART - 3


RECORD/PLAY BACK IS NOT OBTAINABLE
MOTOR (151,152,153) DOES NOT ROTATE
CAPSTAN MOTOR (152) DOES NOT ROTATE
REEL MOTOR (151,153) DOES NOT ROTATE
DEFECTIVE POWER SWITCH (S13)
DEFECTIVE AUTO STOP SWITCH (S12)
DEFECTIVE PLUG (P7) OR SOCKET (SO7)
DEFECTIVE MODE SWITCH (S7)
DEFECTIVE RELAY (RY1, RY2, RY3, RY4)
DEFECTIVE RELAY POWER CIRCUIT
DEFECTIVE POWER TRANS (T3)
DEFECTIVE CAPACITOR (C224, C226, C227, C222, C221)
DEFECTIVE MOTOR (151, 153)
DEFECTIVE RESISTOR (R221,R222)
PLUNGER (L11, L12) OUT OF PLACE
DEFECTIVE RELAY (RY1, RY2, RY3, RY4)
DEFECTIVE PLUNGER (L11, L12)
DEFECTIVE PLUNGER POWER SUPPLY CIRCUIT
ACTUATING PLUNGER DOES NOT OPERATE
ABNORMAL ACTUATING PLUNGER (L11, L12)
SPEED CHANGE CAM (158, 159) NOT ADJUSTED PROPERLY
INSUFFICIENT IDLER LEVER (80, 89) PRESSING
OILY SURFACE OF IDLER (77)
LOOSE MOTOR PULLEY SET SCREW (86)
FLYWHEEL (88) OUT OF LUBRICATION
MOTOR (151,152,153) ROTATE
CAPSTAN MOTOR (152) ROTATES
CAPSTAN AND FLY WHEEL (88) DOES NOT ROTATE
CAPSTAN AND FLYWHEEL (88) ROTATE
PINCH ROLLER (56) OUT OF LUBRICATION
INSUFFICIENT PINCH ROLLER PRESSURE
PINCH ROLLER PRESSURE NOT ADJUSTED PROPERLY
DEFECTIVE RELAY (RY1, RY2, RY3, RY4)
DEFECTIVE PINCH ROLLER PLUNGER (L13)
OILY SURFACE OF PINCH ROLLER (56) OR CAPSTAN (88)
TURNING DIRECTION NOT CHANGED
DEFECTIVE RELAY (RY1, RY2, RY3, RY4)
DEFECTIVE MODE SWITCH (S7)
ABNORMAL REEL MOTOR (151,153)
DEFECTIVE REEL MOTOR (151, 153)
ABNORMAL BRAKE (19)
BRAKE GUIDE LEVER (31, 33) OUT OF PLACE
DEFECTIVE PLUNGER (L11, L12)

TROUBLE CHART - 4


RECORDER IN PLAYBACK MODE
DOES NOT PLAY BACK AT ALL
A "CLICK" IS HEARD WHEN CIRCUIT TESTER PROBE CONTACTS BASE OF TRANSISTOR(Q1, Q2)
THE "CLICK" IS NOT HEARD WHEN CIRCUIT TESTER PROBE CONTACTS BASE OF TRANSISTOR (Q1, Q2)
PLAYS BACK BUT INSUFFICIENT VOLUME AND SOUND DISTORTED
MAKE VOLTAGE CHECK OF ALL TRANSISTORS
LEVEL METER (M1, M2) IS NORMAL
INSUFFICIENT HIGH FREQUENCY RESPONSE WHEN RECORDED BY OTHER RECORDER
R/P HEAD BRACKET (49, 50) NOT ADJUSTED PROPERLY
PLAY BACK BUT TONE ADJUSTMENT IS NOT OBTAINABLE
DEFECTIVE TONE CONTROL (R237, R238)
DEFECTIVE CAPACITOR (C57, C58, C60, C61 C62, C63, C64)
DEFECTIVE RESISTOR (R101, R102)
PLAYS BACK BUT LEVEL METER DOES NOT SWING OR ABNORMAL
DEFECTIVE LEVEL METER (M1, M2)
DEFECTIVE LEVEL METER RECTIFIER (D1, D2)
DEFECTIVE CONTROL (R239, R240)
DEFECTIVE RESISTOR (R121, R122, R123, R124)
DEFECTIVE R/P SWITCH (S1, S2)
DOES NOT PLAY BACK BY R/P CORD
DOES PLAYBACK BUT EXCESSIVE HUM AND NOISE
BE CONTACT WITH VOLUME CONTROL (R235, R236)
NOT CONTACT WITH VOLUME CONTROL (R235, R236)
DEFECTIVE R/P HEAD
DEFECTIVE CAPACITOR (C5, C6)
DEFECTIVE R/P SWITCH (S1, S2)
DEFECTIVE PLUG (P1, P2) OR SOCKET (SO1, SO2)
VOLTAGE MEASURED AS NORMAL BUT NO SOUND
DEFECTIVE JACK (J3, J4, J5, J6, J7, J8, J9)
DEFECTIVE SPEAKER (SP1, SP2, SP3, SP4)
DEFECTIVE EARPHONE OR HEADPHONE PLUGS
DEFECTIVE HEADPHONE
VOLTAGE MEASURED AS NORMAL BUT INSUFFI– CIENT VOLUME AND DISTORTED OR POOR FREQUENCY RESPONSE
ABNORMAL VOLTAGE MEASURED
DEFECTIVE R/P CORD
DEFECTIVE R/P SOCKET (SO9, SO10)
DEFECTIVE PLUG (P3), SOCKET (SO3)
DEFECTIVE LINE-OUT TRANSISTOR (Q15, Q16), RESISTOR (R39, R40, R43 R44, R45, R46, R47, R48, R49, R50, R51, R52) OR CAPACITOR (C23, C24, C25, C26, C27, C28)
DEFECTIVE SPEAKER CORD CORD OR PLUG
DEFECTIVE R/P SWITCH (S1 S2)
DEFECTIVE COUPLING CAPACITOR (C19, C20, C39, C40, C43, C44, C49, C50, C53, C54, C69, C70)
DEFECTIVE RESISTOR R57, R58, R85, R86)
DEFECTIVE VOLUME CONTROL (R235, R236)
DEFECTIVE TONE CIRCUIT
DEFECTIVE ST/MONO SWITCH (S7)
DEFECTIVE PLUG (P4) OR SOCKET (SO4)
DEFECTIVE DRIVER TRANS. (T1, T2)
DEFECTIVE MUTING SWITCH (S6)
INSUFFICIENT + B VOLTAGE
DEFECTIVE TRANSISTOR (Q1, Q2)
TAPE WORN OUT
R/P HEAD MAGNETIZED
DEFECTIVE RESISTOR (R7, R8, R15, R16, R17 R18, R19, R20, R21, R22)
HUM CANCEL COIL (L1, L2, L3, L4) NOT ADJUST-ED PROPERLY
DEFECTIVE DECOUPLING CAPACITOR (C9, C10, C33, C34, C51, C52)
CONTROLS (R231, R232, R234) NOT ADJUSTED PROPERLY
DEFECTIVE EMITTER RESISTOR(C7, C8, C13, C14, C41, C42, C47, C48, C55, C56)
DEFECTIVE R/P SWITCH (S1, S2)
DIRTY SURFACE OF R/P HEAD (38)
LICRINATION OF R/P HEAD (38)
DEFFECTIVE DRIVER TRANS. (T1, T2)
DEFECTIVE SPEAKER (SP1, SP2, SP3, SP4)
DEFECTIVE CAPACITOR (C73, C74)
DEFECTIVE R/P EQUALIZER CAPACITOR (C29, C30, C31, C32)
DEFECTIVE R/P EQUALIZER RESISTOR (R31, R32, R33, R34, R37, R38, R133, R134)
DEFECTIVE DECOUPLING CAPACITOR (C9, C10, C33, C34, C51, C52, C109, C110)
DEFECTIVE R/P EQUALIZER SWITCH (S5)
DEFECTIVE RIPPLE FILTER CAPACITOR (C109, C110, C228, C230) RESISTOR (R159, R160) OR TRANSISTOR (Q19)
DEFECTIVE DECOUPLING CAPACITOR (C33, C34, C51, C52)
DEFECTIVE POWER RECTIFIER (SR1, SR2, SR3, SR4)
DEFECTIVE POWER RECTIFIER (SR1, SR2, SR3, SR4)
DEFECTIVE POWER TRANS. (T3)
DEFECTIVE RIPPLE FILTER RESISTOR(R109 R110)
DEFECTIVE PLUG (P7) OR SOCKET (SO7)
DEFECTIVE RIPPLE FILTER CAPACITOR (C109 C110) TRANSISTOR (Q19)
DEFECTIVE CAPACITOR (C226, C227, C229)
DEFECTIVE POWER RECTIFIER FILTER CAPACITOR (C228, C230)
DEFECTIVE PLUG (P5, P6) OR SOCKET (SO5, SO6)
DEFECTIVE DRIVER TRANS. (T1, T2)
DEFECTIVE COLLECTOR RESISTOR (R15, R16, R21, R22, R51, R52, R69, R70, R83, R84)
DEFECTIVE EMITTER RESISTOR (R9, R10, R11, R13, R14, R19, R20, R65, R66, R67, R68, R79, R80, R81, R82, R95, R96, R97, R98, R115, R116, R117, R118)
DEFECTIVE BASE BREEDER RESISTOR (R7, R8, R17, R18, R61, R62, R63, R64, R73, R74, R75, R76, R89, R90, R91,R92, R107, R108, R109, R110, R111, R112, R113, R114)
DEFECTIVE DECOUPLING RESISTOR (R41, R42, R71, R72, R93, R94)
DEFECTIVE DECOUPLING CAPACITOR (C9, C10, C33, C34, C51, C52)
DEFECTIVE CAPACITOR (C5, C6, C7, C8, C13, C14, C19, C20, C23, C24, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C53, C54, C55, C56, C65, C66, C67, C68, C69, C70)
DEFECTIVE TRANSISTOR (Q1 ~ Q19)
DEFECTIVE THERMISTOR (TH1, TH2, TH3, TH4)
DEFECTIVE FORWARD/ REVERSE SWITCH (S3)
DEFECTIVE R/P SWITCH (S1, S2)
DEFECTIVE CONTROL (R231, R232, R234)

TROUBLE CHART - 5


DOES NOT OPERATE AT ALL
MAKE VOLTAGE CHECK OF POWER SUPPLY CIRCUITS OF PLUNGER AND RELAY
ABNORMAL VOLTAGE MEASURED
DEFECTIVE CAPACITOR (C224, C226, C227)
FUSE (F1) WORN OUT
DEFECTIVE AC CORD AND PLUG
DEFECTIVE POWER SWITCH (S13)
DEFECTIVE RECTIFIER (SR1, SR2, SR3, SR4)
DEFECTIVE RESISTOR (R223, R224)
DEFECTIVE POWER TRANS (T3)
NORMAL VOLTAGE MEASURED
DEFECTIVE SHUT OFF SWITCH (S12)
DEFECTIVE PUSH BUTTON SWITCH (S11)
DEFECTIVE RELAY (RY4)
DEFECTIVE PLUG (P7) OR SOCKET (SO7)
DEFECTIVE POWER SWITCH (S13)
DEFECTIVE PLUNGER (L11, L12)
ABNORMAL OPERATION
DEFECTIVE RELAY (RY1, RY2, RY3, RY4)
DEFECTIVE PUSH BUTTON SWITCH (S11)
DEFECTIVE POWER SUPPLY CIRCUITS OF PLUNGER OR RELAY
DEFECTIVE POWER TRANS (T3)
DEFECTIVE PLUNGER (L11, L12)
INSUFFICIENT AC LINE VOLTAGE
OPERATION STOPS BY A FAINT VIBRATION
DEFECTIVE CAPACITOR (C217)
DEFECTIVE RELAY (RY1, RY2, RY3, RY4)
DEFECTIVE RELAY POWER SUPPLY CIRCUIT
DEFECTIVE POWER TRANS. (T3)
DOES NOT REVERSE
SENSING SWITCH (S9, S10) OFF CENTER
DEFECTIVE SENSING SWITCH (S9, S10)
ABNORMAL RECORD BUTTON SWITCH (S11)
BUTTON NOT PUSHED
DEFECTIVE LOCK LEVER SPRING (184)
BUTTON PUSHED BUT RECORD IS NOT OBTAINABLE
POORLY ADJUSTED RECORD (181) NOT BUTTON ROD
DEFECTIVE R/P SWITCH CORD (129, 130)
DEFECTIVE SWITCH (S1, S2)
DEFECTIVE RECORD LEVER (177)
BUTTON PUSHED BUT NOT LOCKED
DEFECTIVE LEVER SPRING (184)
DEFECTIVE LEVER (177)
MAKE STOP MODE FROM RECORD BUT RECORD SWITCH (S1, S2) NOT BECOME PLAYBACK
DEFECTIVE LEVER SPRING (184)
DEFECTIVE LEVER (177)
DEFECTIVE R/P SWITCH SPRING (138)
ABNORMAL REVERSE SWITCH (S3)
NOT BECOME REVERSE
DEFECTIVE PLUNGER (L11, L12)
DEFECTIVE RELAY (RY1, RY2, RY3, RY4)
DEFECTIVE PLUNGER POWER SUPPLY CIRCUIT
DEFECTIVE POWER TRANS (T3)
DEFECTIVE PUSH BUTTON SWITCH (S11)
DEFECTIVE REVERSE SWITCH ROD (133)
DEFECTIVE LEVER (134)
NOT BECOME FORWARD FROM REVERSE
DEFECTIVE SPRING (140)
DEFECTIVE LEVER (134) AND ROD (133)
DEFECTIVE PUSH BUTTON SWITCH (S11)
DEFECTIVE RELAY (RY1, RY2, RY3, RY4)

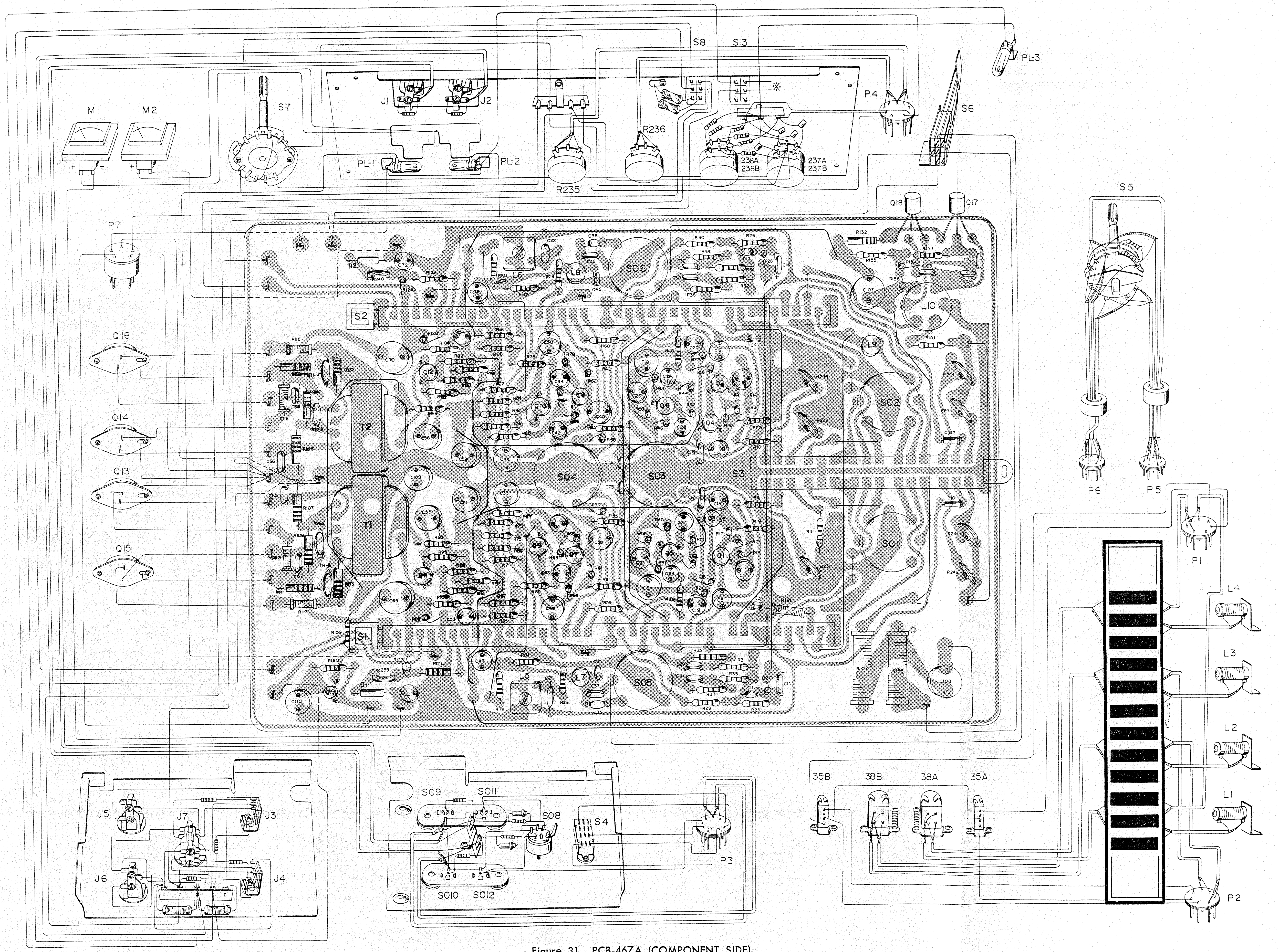

M1
M2
S7
J1
J2
PL-1
PL-2
R235
R236
S8
S13
236A
236B
237A
237B
P4
S6
PL-3
S5
Q18
Q17
P6
P5
P7
Q16
Q14
Q13
Q15
S2
S1
T2
T1
L6
L8
L10
L9
L5
L7
S06
S05
S04
S03
S02
S01
S3
P1
L4
L3
L2
L1
P2
35B
38B
38A
35A
J5
J7
J3
J6
J4
S09
S011
S08
S4
S010
S012
P3

Figure 31 PCB-467A (COMPONENT SIDE)

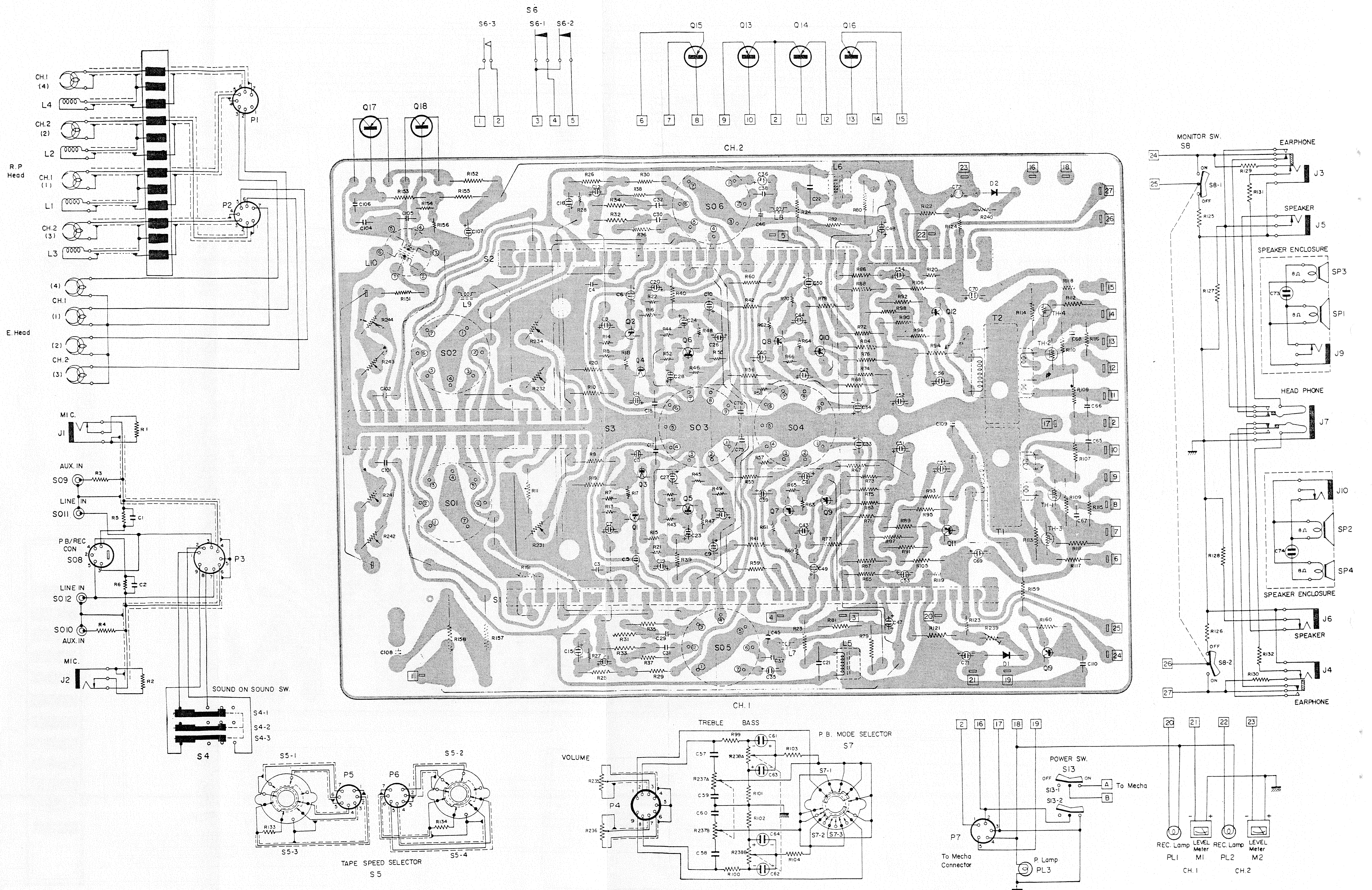

S6
S6-3
S6-1
S6-2
Q15
Q13
Q14
Q16
Q17
Q18
CH.2
CH.1
CH.1 (4)
L4
CH.2 (2)
L2
R.P Head
CH.1 (1)
L1
CH.2 (3)
L3
P1
P2
E. Head
MIC.
J1
AUX. IN
SO9
LINE IN
SO11
P.B/REC CON
SO8
P3
LINE IN
SO12
SO10
AUX. IN
MIC.
J2
SOUND ON SOUND SW.
S4-1
S4-2
S4-3
S4
S5-1
S5-2
P5
P6
S5-3
S5-4
TAPE SPEED SELECTOR
S5
VOLUME
P4
TREBLE
BASS
P.B. MODE SELECTOR
S7
S7-1
S7-2
S7-3
MONITOR SW.
S8
S8-1
S8-2
ON
OFF
EARPHONE
J3
SPEAKER
J5
SPEAKER ENCLOSURE
SP3
SP1
J9
HEAD PHONE
J7
J10
SP2
SP4
SPEAKER ENCLOSURE
J6
SPEAKER
J4
EARPHONE
POWER SW.
S13
S13-1
S13-2
To Mecha
P7
To Mecha Connector
P. Lamp
PL3
REC. Lamp
PL1
LEVEL Meter
M1
REC. Lamp
PL2
LEVEL Meter
M2
CH.1
CH.2
SO1
SO2
SO3
SO4
SO5
SO6
S1
S2
S3
T1
T2
L5
L6
L7
L8
L9
L10

Figure 32 PCB-467A (WIRING SIDE)

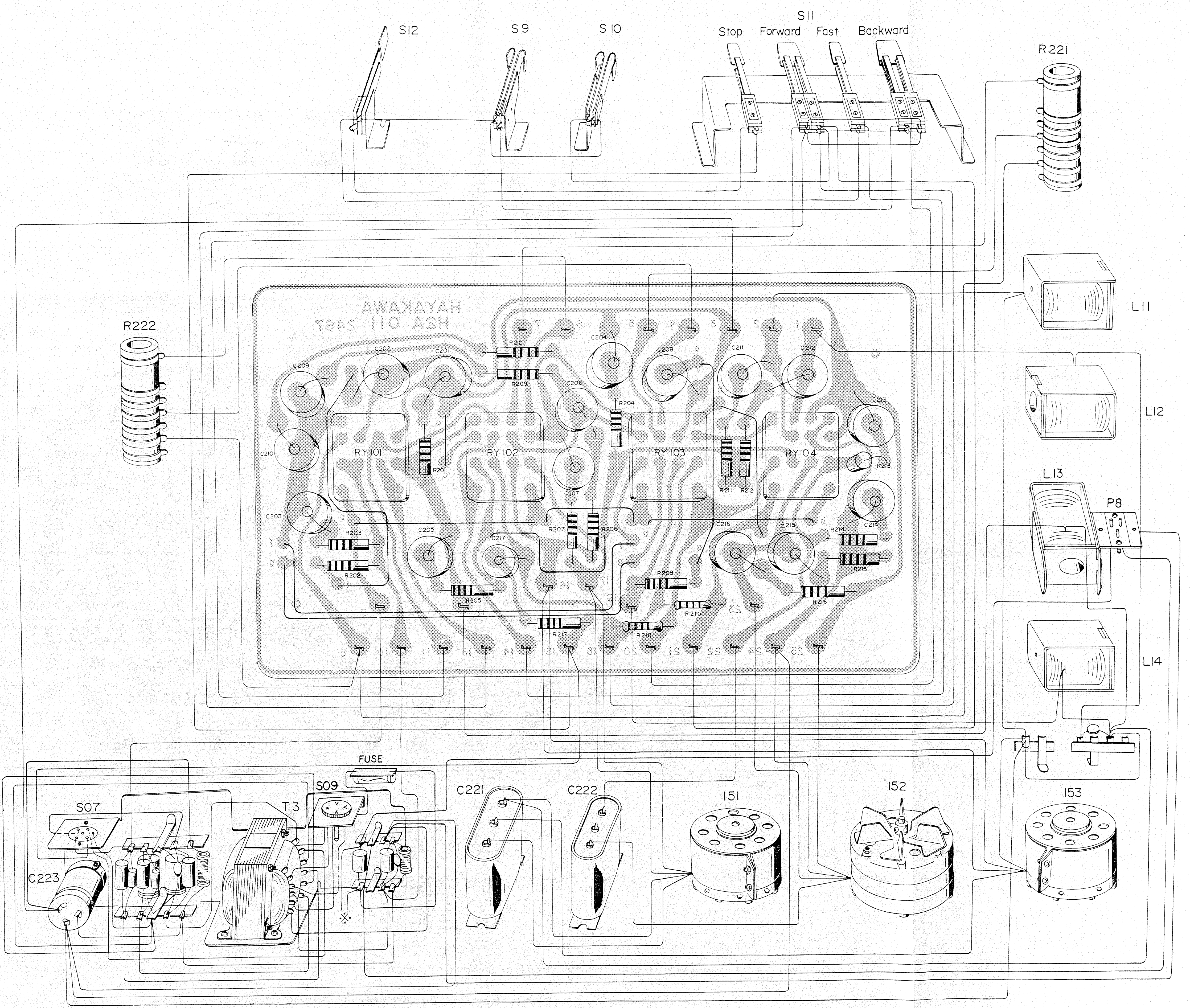

S12
S9
S10
S11
Stop
Forward
Fast
Backward
R221
R222
HAYAKAWA
HZA 011 2457
C201
C202
C203
C204
C205
C206
C207
C208
C209
C210
C211
C212
C213
C214
C215
C216
C217
R201
R202
R203
R204
R205
R206
R207
R208
R209
R210
R211
R212
R213
R214
R215
R216
R217
R218
R219
RY101
RY102
RY103
RY104
L11
L12
L13
P8
L14
FUSE
S07
S09
T3
C221
C222
C223
151
152
153

Figure 33 PCB-467B (COMPONENTSIDE)

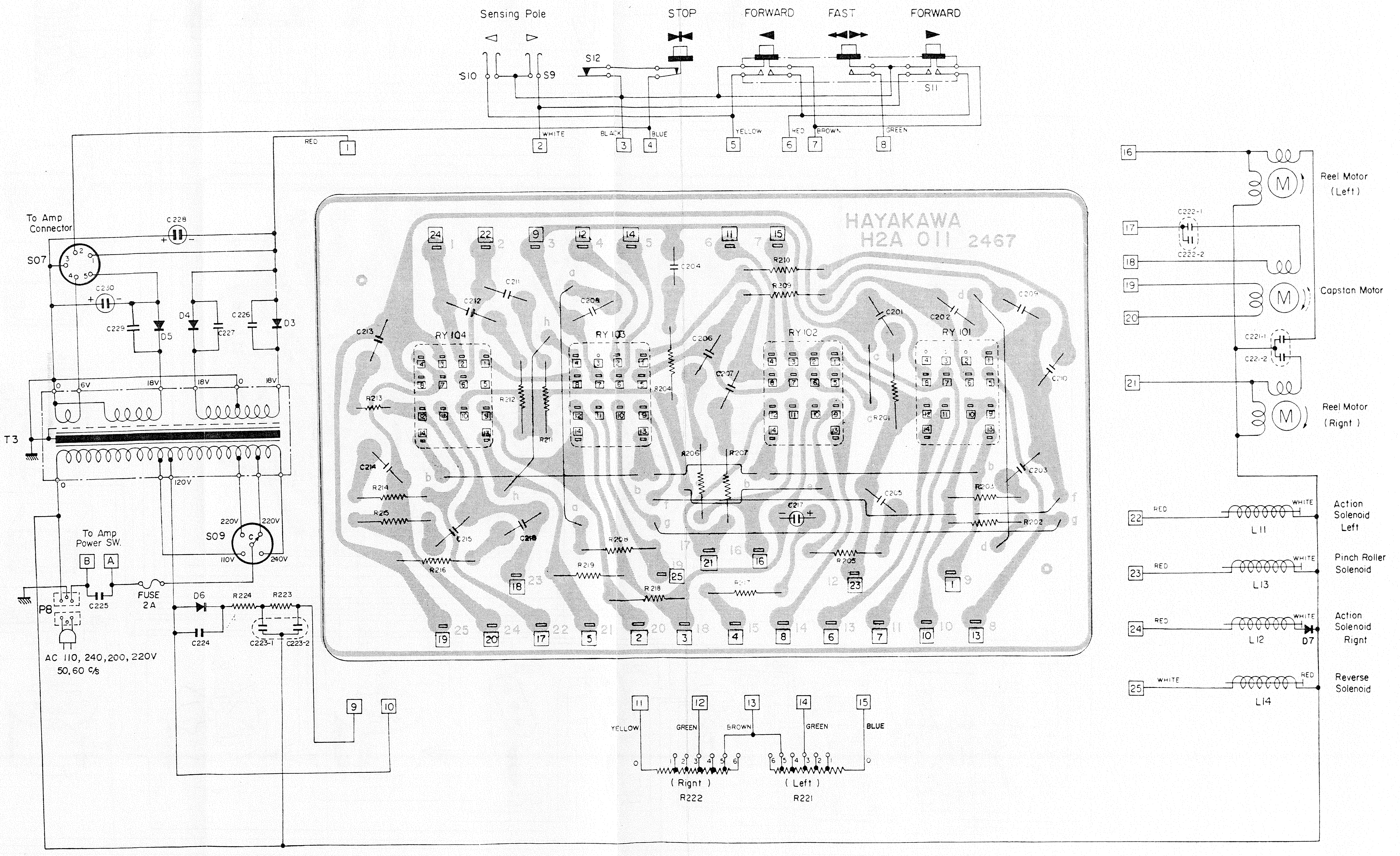
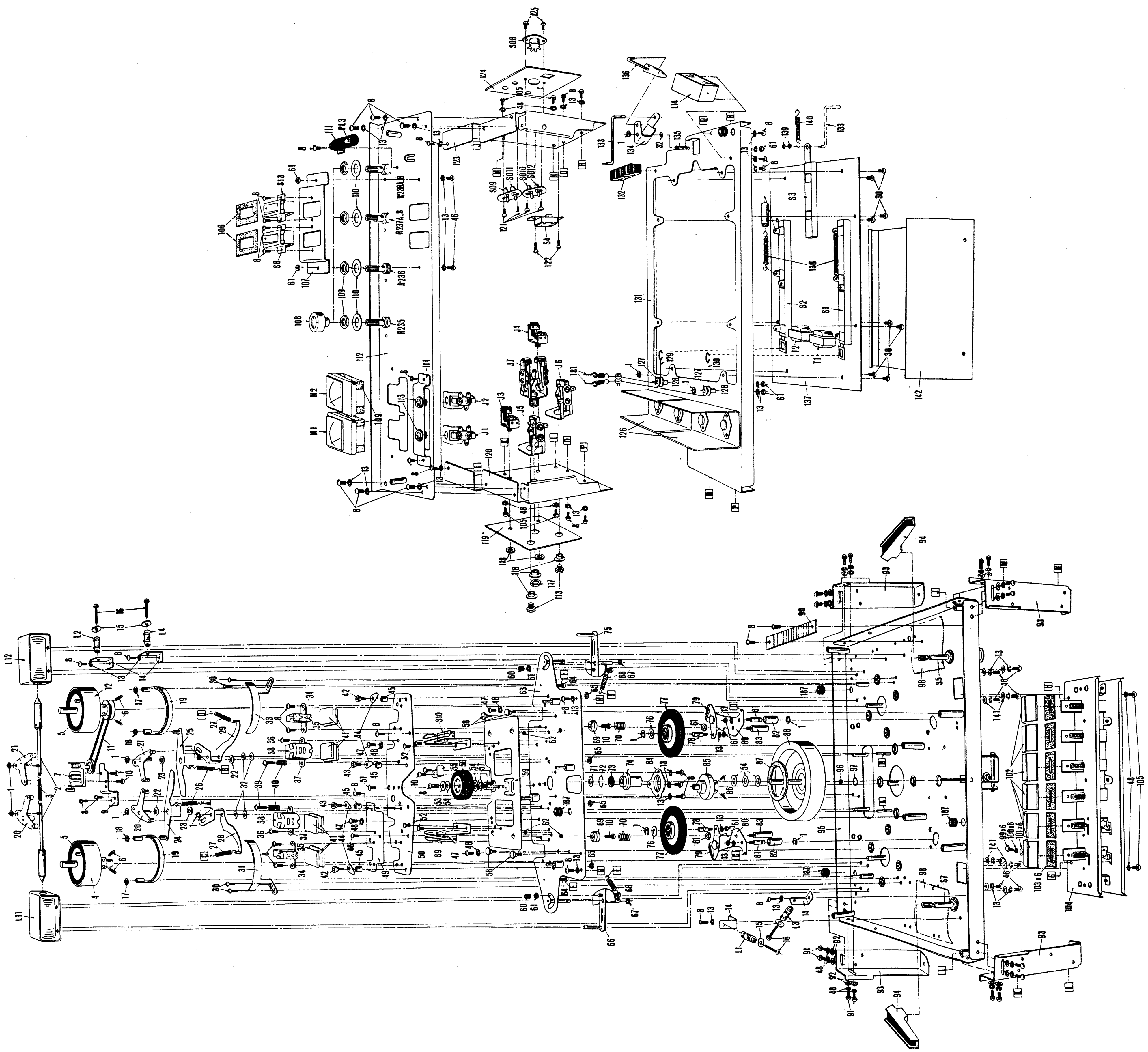
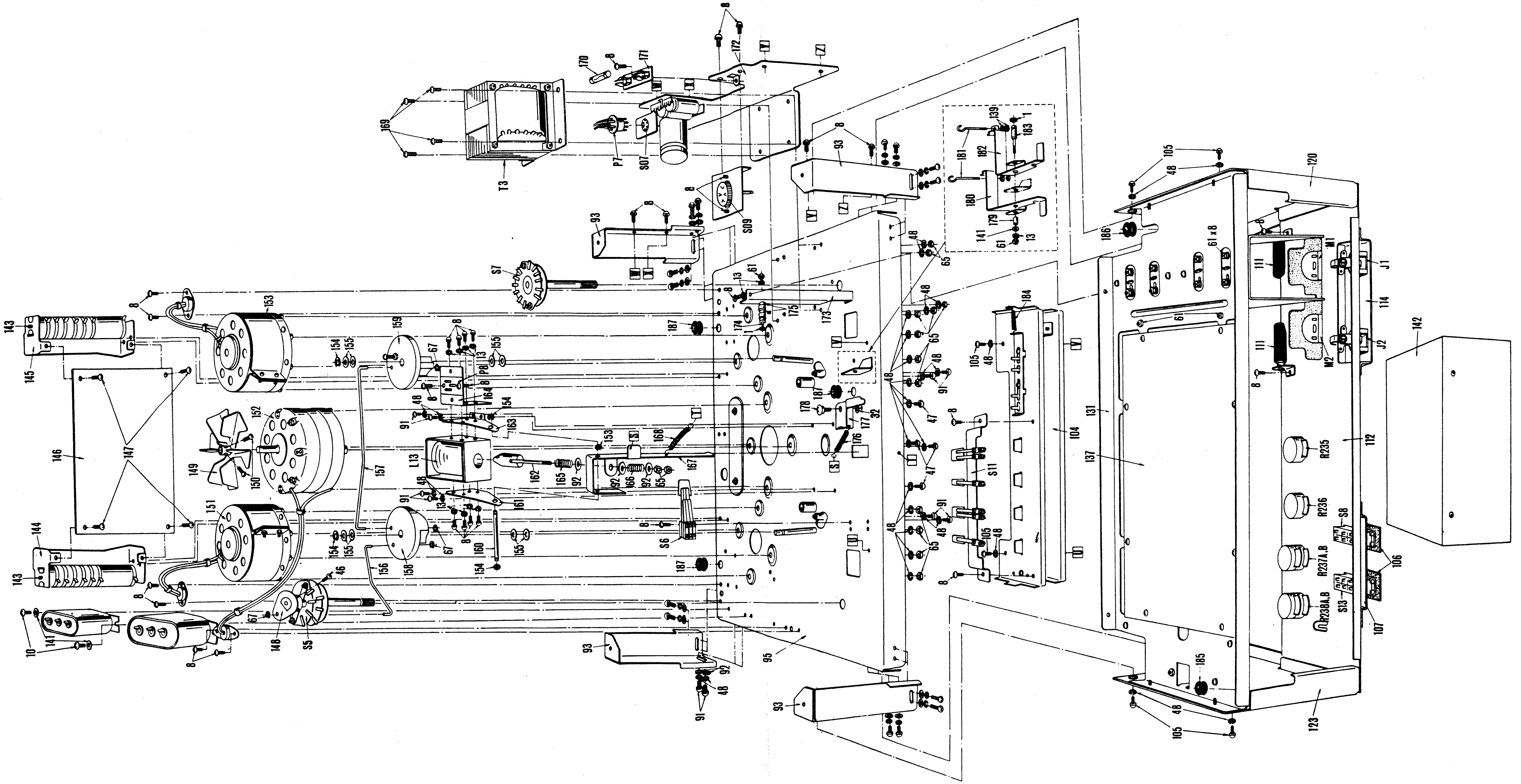

Sensing Pole
STOP
FORWARD
FAST
FORWARD
S10
S9
S12
S11
WHITE
BLACK
BLUE
YELLOW
RED
BROWN
GREEN
RED
To Amp Connector
S07
C228
C230
C229
D5
D4
C227
C226
D3
6V
18V
18V
18V
T3
120V
220V
220V
S09
110V
240V
To Amp Power SW.
B
A
FUSE 2A
P8
C225
D6
R224
R223
C224
C223-1
C223-2
AC 110, 240, 200, 220V 50, 60 C/S
HAYAKAWA H2A 011 2467
RY 104
RY 103
RY 102
RY 101
C204
C211
C212
C208
C206
C207
C201
C202
C209
C210
C213
R213
R212
R211
R204
R210
R209
R201
R206
R207
C214
R214
R215
C215
C216
R216
R208
R219
R218
R217
C217
C205
R205
C203
R203
R202
YELLOW
GREEN
BROWN
GREEN
BLUE
(Right) R222
(Left) R221
Reel Motor (Left)
C222-1
C222-2
Capstan Motor
C221-1
C221-2
Reel Motor (Right)
Action Solenoid Left
L11
Pinch Roller Solenoid
L13
Action Solenoid Right
L12
D7
Reverse Solenoid
L14
WHITE
RED

Figure 34 PCB-467B (WIRING SIDE)

MECHANISM EXPLODED TOP VIEW


L11
L12
L1
L2
L3
L4
L14
M1
M2
PL3
J1
J2
J3
J4
J5
J6
J7
S1
S2
S3
S4
S5
S7
S8
S9
S10
S13
R235
R236
R237A, B
R238A, B
T1
T2
106
107
108
109
110
111
112
113
114
119
120
123
124
126
131
132
133
136
137
138
140
142
93
94
95
96
97
98
102
104
105
187


T3
P7
SO7
SO9
S7
S5
S6
S11
S8
S13
L13
R235
R236
R237A,B
R238A,B
M1
M2
J1
J2
8
10
13
32
46
47
48
61
61 x 8
65
67
91
92
93
95
104
105
106
107
111
112
113
114
120
123
131
137
139
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187

MECHANISM EXPLODED BOTTOM VIEW

MECHANICAL PARTS LIST

REF. NO.	PART NO.	DESCRIPTION (PART NAME)
1	1392259750	"E" Ring, (E-STOP-RING)
2	1360207200	Lever, Plunger Connecting (LEVER-467A)
3	1361210450	Spring, Plunger Actuating (SPR-467A)
4	1367201700	Spindle, Reel, Left (R-DAI-467A)
5	1396519532	Rubber, Reel Spindle (REEL-GOMU)
6	Not Available	Part of 5
7	1396302400	Counter, Tape (Assembly) (COUNTER-581)
8	5904130063	Screw, 3φ × 6 mm (3M + 6S)
9	1346201153	Bracket, Tape Counter (ANGLE-467D)
10	5904130043	Screw, 3φ × 4 mm (3M + 4S)
11	1365211232	Belt, Tape Counter (BELT-467)
12	1367201800	Spindle, Reel, Right (R-DAI-467B)
13	5934130010	Washer, Lock, 3φ (3SW)
14	1346205153	Bracket, Hum Cancel Coil Retaining (COIL-A-467)
15	5939401490	Washer, Fiber (3.6W10-1.6)
16	5904130251	Screw, 3φ × 25 mm (3M + 25B)
17	1392259250	Ring, Special (CS-STOP-RING)
18	1392259550	"E" Ring, 2.5 mm (E-STOP-RING)
19	1396501900	Shoe, Brake (BRAKE-467)
20	1360207300	Lever, Actuating, Left (LEVER-467B)
21	1360207400	Lever, Actuating, Right (LEVER-467C)
22	5939402470	Washer, Fiber (8.2W12-0.5)
23	1396302550	Spacer, Brake Lever Height Adjust (SPACER-467A)
24	1300207500	Lever, Brake, Left (LEVER-467D)
25	1360207600	Lever, Blake, Right (LEVER-467E)
26	1361210550	Spring, Brake Lever (SPR-467B)
27	1361210650	Spring, Idler Connecting (Lever SPR-467C)
28	1360207753	Lever, Idler Connecting, Left (LEVER-467F)
29	1360207853	Lever, Idler Connecting, Right (LEVER-467G)
30	5904730063	Screw, 3φ × 6 mm (3T + 6S)
31	1396302053	Guide, Brake, Left (B-GUID-467A)
32	5939400830	Washer, Fiber (5.2W10-0.2)
33	1396302153	Guide, Brake, Right (B-GUID-467B)
34	1346221500	Mount, Erase Head (H-MT-467B)
35	1574252500	Head, Erase (HEAD-467B)
36	5904130103	Screw, 3φ × 10 mm (3M + 10S)
37	1346221400	Mount, R/P Head (H-MT-467A)
38	1574252400	Head, R/P (HEAD-467A)
39	5904130203	Screw, 3φ × 20 mm (3M + 20S)
40	1361206850	Spring, Head Adjustment (SPR-271Q)
41 A B C	1396302751 1396302851 1396304251	Spacer, Head Height Adjustment (SPACER-467C) (SPACER-467D) (SPACER-467E)
42	1346201251	Guide, Tape, Outside (Stainless) (T-GUIDE-467A)
43	1346201351	Guide, Tape, Inside (Brass) (T-GUIDE-467B)
44	1346296350	Supporter, Tape (TAPE-S1J1)
45	1396302650	Spacer, Tape Guide (SPACER-467B)
46	5904130083	Screw, 3φ × 8 mm (3M + 8S)
47	5904140103	Screw, 4φ × 10 mm (4M + 10S)
48	5934140010	Washer Lock, 4φ (4SW)
49	1346221053	Bracket, Heads, Small (H-DAI-467B)
50	1346220953	Bracket, Heads, Large (H-DAI-467A)
51	5904530063	Screw, 3φ × 6 mm (3M + 6S)
52	5904126033	Screw, 2.6φ × 3 mm (2.6M + 3S)
53	5939300464	Washer, Metal (3.2W10-0.5)
54	5939401690	Washer, Nylon (6.2W13.5-0.2)
55	1346201053	Metal, Pinch Roller Bracket (ANGLE-467C)
56	1364250200	Roller, Pinch (PINCH-ROLL)
57	5939401630	Washer, Fiber (6.2W13.5-0.2)
58	5909530450	Screw, Special (3TOK-7)
59	136028300	Bracket, Pinch Roller (LEVER-467L)
60	Not Available	Sleeve, Rubber, Part of 66 or 75
61	5930130243 5926130243	Nut, Hex, 3φ (3N)
62	1396302200	Bearing, Ball, Pinch Roller Bracket (BALL-467)
63	1306240400	Sub-Chassis (6SC-467)
64	5904130253	Screw, 3φ × 25 mm (3M + 25S)
65	5926140403	Nut, Hex, 4φ)4N)
66	1360208100	Lever, Tension Arm, Left (LEVER-467J)
67	1392259350	"E" Ring, 2 mm (E-STOP-RING)
68	1361210850	Spring, Tension Arm (SPR-467E)
69	Not Available	Retainer, Idler Spring. Part of 63
70	1361210750	Spring, Idler (SPR-467D)
71	5939400810	Washer, Silicon Rubber (5.2W10-10)
72	1361206050	Spring, Capstan Bearing Retaining (OIL-SPRING)
73	1171230500	Washer, Sponge Rubber (MOLT-P-305)
74	1364270900	Bearing, capstan (METAL)
75	1360208200	Lever, Tension Arm, Right (LEVER-467K)
76	Not Available	Spacer (Part of 80 or 89)
77	Not Available	Idler (Part of 80 or 89)
78	Not Available	Shaft, Idler (Part of 80 or 89)
79	Not Available	Spring, Idler Lever (Part of 80 or 89)
80	1364210200	Lever, Idler, Left (Ass'y) (IDLER-467A)
81	Not Available	Shaft, Sleeve
82	Not Available	Sleeve
83	Not Available	Shaft, Guide
84	1346293853	Holder, Capstan Bearing (METAL-OSAE)
85 A B	1364294900 1364295000	Pulley, Motor (PULLEY-467A, B)
86	Not Available	Part of 85, Screw
87	1170219100	Felt, Flywheel (FELT-191)
88	1364230700	Flywheel & Capstan Assembly (FLY-467)
89	1364210300	Lever, Idler, Right (IDLER-467B)
90	1303255500	Printed Circuit Board, Wiring (PCB-561B)
91	5904140083	Screw, 4φ × 8 mm (4M + 8S)
92	5939301094	Washer, Metal (4.3W10-0.8)
93	1346202053	Bracket, Cabinet (CAB-ANGLE-467)
94	11082238	Knob, Mode Selector and Speed Selector (8K-238)
95	1306211100	Main Chassis (6MC-467)
96	1396294150	Bearing, Ball, Flywheel (BALL)
97	Not Available	Retainer, Flywheel Ball Bearing, Part of 95
98	1170226332	Felt, Tension Arm, Mark (FELT-263)
99	5904126043	Screw, 2.6φ × 4 mm (2.6M + 4S)
100	5934126010	Washer, Metal, 2.6φ (2.6SW)
101	5939301513	Washer, Metal (2.9W5-0.5)
102	11082239	Button, Push (Ivory) (8K-239)
103	1170226532	Felt, Push Button (FELT-265)

REF. NO.	PART NO.	DESCRIPTION (PART NAME)
104	1366210300	Bracket, Button (Assembly) (B-ASSY-467)
105	5904140063	Screw, 4φ × 6 mm (4M + 6S)
106	1170216132	Felt, Power Switch and Sound Monitor Switch (FELT-911C)
107	1346202153	Bracket, Power Switch Mounting (SW-ANG-467A)
108	11082240	Know, Volume and Tone (8K-240)
109	1171230300	Cushion, Level Meter (MOLT-P-379)
110	2392233600	Spacer, Jack (SPACER-911A)
111	1330243500	Cover, Pilot Lamp (PC-435)
112	1346280853	Bracket, Variable Resistor Mounting (VR-ANG-467)
113	Not Available	Part of J1, 2, 5, 6, 9 and J10
114	1346201950	Blacket, Microphone Jack (J-ANG-467C)
115	1332238100	Insulator, Wiring (P.C.B.) (ZET-P-467)
116	2392233700	Spacer, Jack (SPACER-911B)
117	Not Available	Part of J7, Nut, Hex
118	Not Available	Part of J3, J4
119	11242443	Plate, Jack, Left (IND-P-467E)
120	1346201753	Bracket, Jack Mounting, Left (J-ANG-467A)
121	5904730033	Screw, 3φ × 3 mm (3T + 3S)
122	5904130033	Screw, 3φ × 3 mm (3M + 3S)
123	1346201853	Bracket, Jack Mounting, Right (J-ANG-467B)
124	11242444	Plate, Jack, Right (IND-P-467F)
125	5904830088	Screw, Chrome, 3φ × 6 mm (3B + 6S)
126	1330239751	Heat Sink, Power Transistor (HON-P-467)
127	1351278900	Pulley, Cord (P-789)
128	1363207250	Shaft, Cord Pulley (SHAF-467T)
129	1396303000	Cord, Short (ROPE-467B)
130	1396302900	Cord, Long (ROPE-467A)
131	1306260453	Chassis, Amplifier (6AMP-C-467)
132	1330238900	Radiator, Transistor (RADIATOR)
133	Not Available	Part of 134, Rod
134	1360208753	Lever, Channel Selector (LEVER-467R)
135	1363207350	Shaft, Channel Selector Lever (SHAFT-467J)
136	Not Available	Part of 134, Plunger
137	1303255600	Printed Circuit Board, Amplifier (PCB-467A)
138	Not Available	Part of S1, S2, Spring
139	5926120203	Nut, Hex. 2φ (2N)
140	1361211450	Spring, Channel Selector Lever Return (SPR-467J)
141	5933130053	Washer, 3φ. Metal (3W)
142	1330250153	Cover, Shield (SHIELD-467)
143	5904140953	Screw, 4φ × 95 mm (4M-95S)
144	1346202853	Bracket, P.C.B. Relay, Right (PCB-A-467B)
145	1346202753	Bracket, P.C.B. Relay, Left (PCB-A-467A)
146	1303255700	Printed Circuit Board, Relay (PCB-467B)
147	5904740063	Screw, 4φ × 6 mm (4T + 6S)
148	1360207900	Lever, Speed Selector (LEVER-467H)
149	Not Available	Fan, Motor (Part of 152)
150	Not Available	Screw, Fan Retaining (Part of 152)
151	1574204000	Motor, Reel Spindle, Right (MOTOR-581B)
152	1574204100	Motor, Capstan (MOTOR-581C)
153	1574203900	Motor, Reel Spindle, Left (MOTOR-581A)
154	1392251150	"E" Ring, 4 mm (E-STOP-RING)
155	5939402630	Washer, Fiber (6.2W13.5-0.3)
156	1362202150	Rod, Cam Connecting, Short (ROD-467B)
157	1362202050	Rod, Cam Connecting, Long (ROD-467A)
158	1396233900	Cam, Idler, Right (CAM-467B)

REF. NO.	PART NO.	DESCRIPTION (PART NAME)
159	1396233800	Cam, Idler, Left (CAM-467A)
160	1363206950	Shaft, Pinch Roller Lever (SHAFT-467A)
161	1346200953	Bracket, Pinch Roller Plunger, Right (ANGLE-467B)
162	1362202253	Rod, Plunger Connecting (ROD-467C)
163	1346200853	Bracket, Pinch Roller Plunger, Left (ANGLE-467A)
165	1361211150	Spring, Pinch Roller Plunger Lever (SPR-467H)
166	1361211050	Spring, Pinch Roller Plunger (SPR-467G)
167	1360208053	Lever, Pinch Roller Plunger (LEVER-467I)
168	1361210950	Spring, Pinch Roller Return (SPR-467F)
169	5904140123	Screw, 4φ × 12 mm (4M + 12S)
170	1590230400	Fuse (FUSE-2A)
171	1324210200	Holder, Fuse (FH-102)
172	1346270853	Bracket, Power Transformer Mounting (PT-ANG-467)
173	1346202253	Bracket, Cord Pulley Mounting (PU-ANG-467)
174	1363207150	Shaft, Cord Pulley (SHAFT-467H)
175	1396303151	Spacer, Cord Pulley Shaft (SPACER-467E)
176	1361212750	Spring, Record Connecting Lever (SPR-467P)
177	1360208453	Lever, Record Connecting (LEVER-467M)
178	5909430853	Screw, Special (3TOK-6.2)
179	1364291951	Sleeve, Record Switch Operating Lever (SLEEVE-B)
180	1360208653	Lever, Record Switch, Right (LEVER-467P)
181	1362202353	Rod, Cord Adjustment (ROD-467D)
182	1360208553	Lever, Record Switch, Left (LEVER-467N)
183	1363207050	Shaft, Record Switch Operating Lever (SHAFT-467G)
184	Not Available	Spring, Record Lock Lever, Part of 104
185	2391231732	Insulator, Small (ZETUEN-BUSH)
186	Not Available	Insulator, Large (ZETUEN-BUSH)
187		Insulator (3 pcs.) part of 95
188	1586226490	Cord, AC (ACC-264)
	1586226290	Cord, AC (ACC-262)
	1586228190	Cord, AC (ACC-281)
	1586227990	Cord, AC (ACC-279)
189	Not Available	Plate, Interlock (LOCK-BAN)
190	1346202553	Bracket, AC Line Cord (AC-SE-A581)
201	11022504	Cabinet Assembly Complete (2CAB-467A)
202	11022505	Box, Speaker (2CAB-581A)
203	11060495	Panel, Reel Deck, Metal (PANEL-467)
204	11922417	Cover, Head, Top (H-COV-467A)
205	11922418	Cover, Head, Bottom (H-COV-467B)
206	11922419	Counter Window, Plastic (CO-WAKU-581)
207	1132496	Baffle (BAFFLE-581)
208	1396213832	Retainer, Reel (REEL-CAP)
209	21812012	Handle (HANDLE-581)
210	1181201658	Retainer, Handle Chrome (HANDLE-M-581)
211	1191284800	Door, Accessory Compartment (Part of 21) (SYUNO-FUTA)
212	1590398700	Microphone (MIC-467)
213	1576200500	Reel, Empty (MTT-7)
214	1576200700	Reel with Pre-Recorded Tape (MTA-267)
215	1589282100	Cord, Connecting (ATTACH-CORD)
216	1589295000	Cord, Connecting (OP-SHIELD)
217	5904730069	Screw, 3φ × 6 mm, Black (3T + 6S)
218	5904640209	Screw, 4φ × 20 mm, Black (4MS + 20S)
219	5904640309	Screw, 4φ × 30 mm, Black (4MS + 30S)
220	5904650358	Screw, 5φ × 35 mm, Chrome (5MS + 35S)
221	5909240330	Screw, Special (4TOK-6)

REF. NO.	PART NO.	DESCRIPTION (PART NAME)
222	5913631259	Screw, Black, Retaining SP Baffle (W3.1MS + 25S)
224	5904130083	Screw, 3φ × 8 mm, Chrome (3M + 8S)
225	5939300759	Washer, Chrome, Metal (3.2W9-20)

REF. NO.	PART NO.	DESCRIPTION (PART NAME)
226	5939300759	Washer, Black, Metal (3.2W9-20)
227	5939301479	Washer, Black, Metal (4WA-2.5)
228	5939400750	Washer, Nylon (3.2W7.9-0.3)
229	11322166	Screw, Tension Arm (DEC-M-467G)

ELECTRICAL PARTS LIST

CAPACITORS

REF. NO.	DESCRIPTION	PART NO.
C_1, C_2	270pfd, 50V, 10%, Discap	T-5-277K
C_3, C_4	.001mfd, 50V, 20%, Mylar	ML-5-106M
C_5, C_6 C_{19}, C_{20} C_{53}, C_{54}	10mfd, 10V, Electroltic	CU-1-102Q
C_7, C_8 C_{25}, C_{26} C_{47}, C_{48}	100mfd, 6V, Electrolytic	CU-06-101Q
C_9, C_{10} C_{33}, C_{34}	100mfd, 16V, Electrolytic	CU-1.6-101Q
C_{11}, C_{12} C_{35}, C_{36} C_{61}, C_{62} C_{15}, C_{16}	.1mfd, 10V, Special	K-TOK-CON
C_{13}, C_{14} C_{41}, C_{42}	47mfd, 10V, Electrolytic	CU-1-472Q
C_{17}, C_{18} C_{29}, C_{30} C_{31}, C_{32} C_{37}, C_{38} C_{59}, C_{60} C_{104}	.33mfd, 50V, 20%, Mylar	ML-5-335M
C_{21}, C_{22}	330pfd, 15V, 10%, Styrol	S-1.5-337K
C_{23}, C_{24} C_{39}, C_{40} C_{43}, C_{44} C_{71}, C_{72}	4.7mfd, 10V, Electrolytic	CU-1-473R
C_{27}, C_{28} C_{49}, C_{50}	10mfd, 25V, Electrolytic	CU-2.5-102Q
C_{45}, C_{46}	.02mfd, 50V, 10%, Mylar	M-5-205K
C_{51}, C_{52}	100mfd, 35V, Electrolytic	CU-3.5-101Q
C_{55}, C_{56}	220mfd, 16V, Electrolytic	CU-1.6-221Q
C_{63}, C_{64}	.2mfd, 10V, Special	K-TOK-CON
C_{73}, C_{74}	5mfd, 25V, Nonpolar	NP-2.5-503U
C_{57}, C_{58} C_{65}, C_{66} C_{67}, C_{67} C_{75}, C_{76}	.015mfd, 50V, 20%, Mylar	ML-5-155M
C_{101}, C_{102}	100pfd, 500V, 10%, Discap	T-50-107K
C_{105}, C_{106}	.01mfd, 50V, 20%, Mylar	ML-5-105M
C_{109}, C_{110}	220mfd, 25V, Electrolytic	CU-2.5-221Q
C_{69}, C_{70} C_{107}, C_{108}	470mfd, 25V, Electrolytic	CU-2.5-471Q
C_{201}, C_{202} C_{203}, C_{204} C_{205}, C_{206} C_{207}, C_{208} C_{209}, C_{210} C_{211}, C_{212} C_{213}, C_{214} C_{215}, C_{216}	.1mfd, 400V, 20%, Oil	OL-40-104M
C_{217}	10mfd, 50V, Electrolytic	CU-5-102Q
C_{221}-A, B	2mfd/2mfd, 300V, Special	MP-TOK-CON
C_{222}-A, B	1.3mfd/.2mfd, 300V, Special	MP-TOK-CON
C_{223}-A, B	100mfd/100mfd, 250V, Electrolytic	25L-200
C_{228}, C_{230}	500mfd, 35V, Electrolytic	CT-3.5-501R
C_{229}	.01mfd, 400V, 20%, Oil	OL-40-105M
C_{224}, C_{225} C_{226}, C_{227}	.047mfd, 400V, 10%, Oil	OL-40-475K

RESISTORS

REF. NO.	DESCRIPTION	PART NO.
R_1, R_2 R_{55}, R_{56} R_{103}, R_{104} R_{218}, R_{219}	4.7K ohm, 1/4W, 10%, Carbon	1/4S A-4.7KK
R_3, R_4	470K ohm, 1/4W, 10%, Carbon	1/4S A-470KK
R_5, R_6 R_{37}, R_{38}	100K ohm, 1/4W, 10%, Carbon	1/4S A-100KK
R_7, R_8 R_{15}, R_{16} R_{61}, R_{62}	22K ohm, 1/4W, 10%, Carbon	1/4S U-22KK
R_9, R_{10}	150 ohm, 1/4W, 10%, Carbon	1/4S A-150K
R_{11}, R_{79} R_{80}, R_{155}	100 ohm, 1/4W, 10%, Carbon	1/4S A-100K
R_{13}, R_{14}	3.3K ohm, 1/4W, 10%, Carbon	1/4S U-3.3KK
R_{17}, R_{18}	47K ohm, 1/4W, 10%, Carbon	1/4S U-47KK
R_{19}, R_{20}	5.6K ohm, 1/4W, 10%, Carbon	1/4S A-5.6KK
R_{21}, R_{22}	8.2K ohm, 1/4W, 10%, Carbon	1/4S U-8.2KK
R_{23}, R_{24} R_{71}, R_{72} R_{95}, R_{96} R_{151}, R_{153}	1K ohm, 1/4W, 10%, Carbon	1/4S A-1KK
R_{25}, R_{26} R_{73}, R_{74} R_{87}, R_{88} R_{91}, R_{92}	10K ohm, 1/4W, 10%, Carbon	1/4S A-10KK
R_{27}, R_{28} R_{154}	1K ohm, 1/4W, 10%, Carbon	1/4S U-1KK
R_{29}, R_{30}	6.8K ohm, 1/4W, 10%, Carbon	1/4S A-6.8KK
R_{31}, R_{32}	3.9K ohm, 1/4W, 10%, Carbon	1/4S A-3.9KK
R_{33}, R_{34} R_{99}, R_{100}	1.5K ohm, 1/4W, 10%, Carbon	1/4S A-1.5KK
R_{35}, R_{36}	47K ohm, 1/4W, 10%, Carbon	1/4S A-47KK
R_{39}, R_{40} R_{81}, R_{82} R_{85}, R_{86}	2.2K ohm, 1/4W, 10%, Carbon	1/4S A-2.2KK
R_{41}, R_{42} R_{83}, R_{84} R_{160}	3.3K ohm, 1/4W, 10%, Carbon	1/4S A-3.3KK
R_{43}, R_{44}	33K ohm, 1/4W, 10%, Carbon	1/4S U-33KK
R_{45}, R_{46}	10K ohm, 1/4W, 10%, Carbon	1/4S U-10KK
R_{47}, R_{48}	68 ohm, 1/4W, 10%, Carbon	1/4S U-68K
R_{49}, R_{50} R_{57}, R_{58} R_{65}, R_{66}	2.2K ohm, 1/4W, 10%, Carbon	1/4S U-2.2KK
R_{51}, R_{52} R_{156}	4.7K ohm, 1/4W, 10%, Carbon	1/4S U-4.7KK
R_{59}, R_{60} R_{97}, R_{98}	22 ohm, 1/4W, 10%, Carbon	1/4S A-22K
R_{63}, R_{64} R_{69}, R_{70}	5.6K ohm, 1/4W, 10%, Carbon	1/4S U-5.6KK
R_{67}, R_{68} R_{93}, R_{94}	220 ohm, 1/4W, 10%, Carbon	1/4S A-220K
R_{75}, R_{76} R_{77}, R_{78}	15K ohm, 1/4W, 10%, Carbon	1/4S A-15KK
R_{39}, R_{90}	22K ohm, 1/4W, 10%, Carbon	1/4S A-22KK
R_{101}, R_{102}	560 ohm, 1/4W, 10%, Carbon	1/4S A-560K
R_{105}, R_{106}	470 ohm, 1/4W, 10%, Carbon	1/4S A-470K
R_{107}, R_{108} R_{111}, R_{112}	680 ohm, 1/2W, 5%, Carbon	1/2M-680 J
R_{109}, R_{110} R_{113}, R_{114}	15 ohm, 1/2W, 5%, Carbon	1/2M-15 J

REF. NO.	DESCRIPTION	PART NO.
R_{115}, R_{116} R_{117}, R_{118} R_{161}	1 ohm, 1/2W, 10%, Resin	1/2L L-1K
R_{119}, R_{120}	100 ohm, 1/4W, 10%, Carbon	1/4S U-100K
R_{121}, R_{122}	82 ohm, 1/4W, 10%, Carbon	1/4S A-82K
R_{123}, R_{124}	330 ohm, 1/4W, 10%, Carbon	1/4S U-330K
R_{125}, R_{126} R_{127}, R_{128}	8 ohm, 3W, 10%, Resin	3L L-8K
R_{129}, R_{130}	68 ohm, 1/2W, 10%, Carbon	1/2M-68K
R_{131}, R_{132}	33 ohm, 1/2W, 10%, Carbon	1/2M-33K
R_{133}, R_{134}	1.2K ohm, 1/4W, 10%, Carbon	1/4S A-1.2KK
R_{152}	10 ohm, 1/2W, 10%, Carbon	1/2M-10K
R_{157}	30 ohm, 2W, 10%, Resin	2L L-30K
R_{158}	10 ohm, 3W, 10%, Resin	3L L-15K
R_{159}	33 ohm, 1/4W, 10%, Carbon	1/4S A33K
R_{201},R_{202} R_{203},R_{204} R_{205},R_{206} R_{207},R_{208} R_{209},R_{210} R_{211},R_{212} R_{213},R_{214} R_{215},R_{216} R_{217}	100 ohm, 1/2W, 10%, Carbon	1/2M-100K
R_{221}, R_{222}	450 ohm, 30W, 10%, Resin	30L T-450K
R_{223}	30 ohm, 10W, 10%, Resin	10L L-30K
R_{224}	8 ohm, 5W, 10%, Resin	5L L-8K
R_{231}, R_{232} R_{234}	200 ohm, Pot, Channel Adjustment	8V-569
R_{235}, R_{236}	5K ohm, Pot., Volume Control	8V-606
R_{237}A, B R_{238}A, B	10K ohm, Pot., Dual Tone Control	8V-606
R_{239}, R_{240}	1K ohm, Pot., Meter Sensitivity	8V-766
R_{241}, R_{242} R_{243}, R_{244}	50K ohm, Channel Adjustment	8V-608

COILS, TRANSFORMERS AND SOLENOIDS

L_1, L_2 L_3, L_4	Coil, Hum Cancel	4L-938
L_5, L_6	Coil, Bias Trap	4L-937
L_7, L_8	Coil, Record Equalizer	4L-943
L_9	Coil, Dummy Load	4L-944
L_{10}	Coil, Bias Oscillator	4L-340B
L_{11}, L_{12}	SOLENOID, Actuating plunger	PLUNG-467A
L_{13}	SOLENOID, Pinch Roller Plunger	PLUNG-467B
L_{14}	SOLENOID, Channel Select Plunger	PLUNG-467C
T_1, T_2	Transformer, Driver	6T-416
T_3	Transformer, Power, UL Spec	5T-530

SEMICONDUCTORS

Q_1, Q_2	Transistor, 1st Audio Amplifier	2SB440
Q_3, Q_4	Transistor, 2nd Audio Amplifier	2SB439
Q_5, Q_6	Transistor, Audio Line Output	2SB54
Q_7, Q_8	Transistor, 3rd Audio Amplifier	2SB54
Q_9, Q_{10}	Transistor, 4th Audio Amplifier	2SB56
Q_{11}, Q_{12}	Transistor, Audio Driver	2SB56A
Q_{13}, Q_{14} Q_{15}, Q_{16}	Transistor, Audio Output	2SB463
Q_{17}, Q_{18}	Transistor, Bias Oscillator	2SB415
Q_{19}	Transistor, Ripple Filter	2SB54
D_1, D_2	Diode, Recording Level	1N-60
SR1, SR2	Rectifier, Power, -23V	DS-1P
SR3	Rectifier, Power, -20V	SD-1Y
SR4, SR5	Relay	SD-1LA
TH1, TH2 TH3, TH4	Thermistor, A.O.C.	D-41A

REF. NO.	DESCRIRTION	PART NO.

SWITCHES

S_1, S_2	Record/Playback	5S-03
S_3	Reverse	5S-05
S_4	Sound on Sound	5S-07
S_5	Equalizer	3S-15
S_6	Muting	8S-75
S_7	Mode Selector	3S-17
S_8	Monitor	8S-73
S_9	Sensing Pole, Left	8S-87
S_{10}	Sensing Pole, Right	8S-89
S_{11}	Push Button (4 Series)	8S-79
S_{12}	Shut-off	8S-85
S_{13}	Power, UL Spec.	8S-35

MISCELLANEOUS

J_1, J_2 J_5, J_6 J_9, J_{10}	Jack, Microphone and External Speaker	J-903
J_3, J_4	Jack, Earphone	J-901
J_7	Jack, Headphone	J-937
PL1, PL2 PL3	Lamp, Pilot, 8V	PL-504
M_1, M_2	Meter, Recording Level Indicator	METER-743
P_1, P_2 P_5, P_6	Plug, Level Meter (7 pins)	PG-158
P_3, P_4	Plug, Level Meter (9 pins)	PG-413
P_7	Plug, (5 pins)	PG-122
P_8	Plug, Interlock, UL Spec.	PG-194
SO1, SO2 SO5, SO6	Socket, Level Meter (7 pins)	SO-187
SO3, SO4	Socket, Level Meter (9 pins)	SO-189
SO7	Socket, Power (5 pins)	SO-910
SO8	Socket, DIN Connector	SO-971
SO9A,SO9B SO10A, SO10B	Socket, Pin Jack	SO-923
SP1, SP2	Speaker, 8″ 8 ohm VCI	20W-35A
SP3, SP4	Speaker, 2 3/8″ 8 ohm, VCI	6T-15K
RY1, RY2 RY3, RY4	Relay	RELAY-467